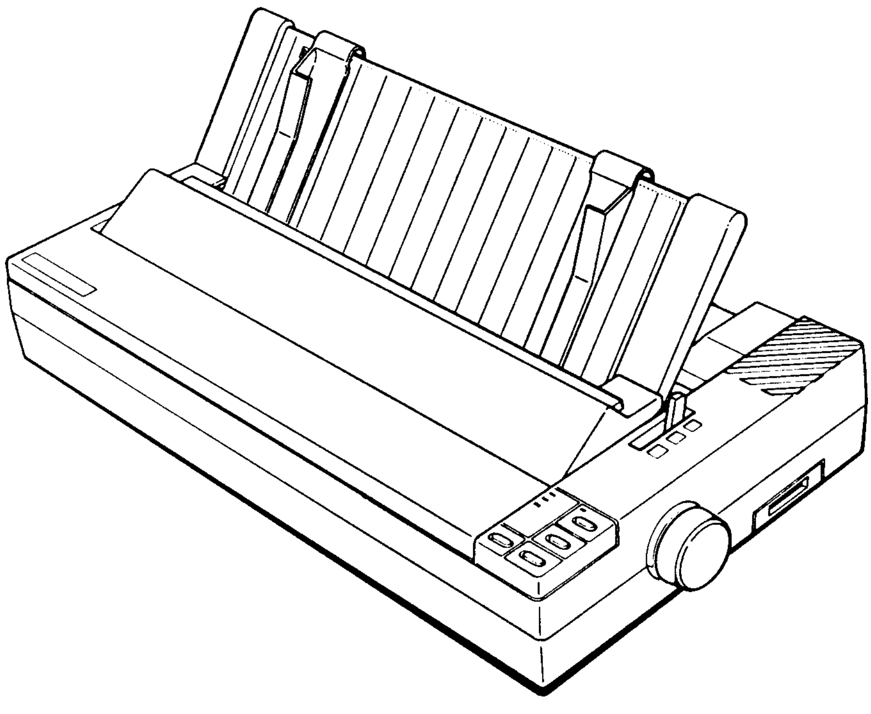
EPSON TERMINAL PRINTER

LX-1050+

SERVICE MANUAL



EPSON

4003283

NOTICE

The contents of this manual are subjects to change without notice.

All efforts have been made to ensure theaccuracyof the contents of this manual. However, should any errors be detected, SEIKO EPSON would greatly appreciate being informed of them.

The above notwithstanding SEIKO EPSON can assume no responsibility for any errors in this manual or the consequence thereof.

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General Notice: Other product names used herein are for identication purposes only and maybe trademarks of their respective campanies.

PRECAUTIONS

Precautionary notations throughout the text are categorized relative to 1) personal injury and 2) damage to equipment.

DANGER Signals a precaution which, if ignored, could result in serious or fatal personal injury. Great caution should be exercised in performing procedures preceded by DANGER Headings.

WARNING Signals a precaution which, if ignored, could result in damage to equipment.

The precautionary measures itemized below should always be observed when performing repair/ maintenance procedures.

DANGER

1. ALWAYS DISCONNECT THE PRODUCT FROM BOTH THE POWER SOURCE AND PERIPHERAL DEVICES PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURE.

2. NO WORK SHOULD BE PERFORMED ON THE UNIT BY PERSONS UNFAMILIAR WITH BASIC SAFETY MEASURES AS DICTATED FOR ALL ELECTRONICS TECHNICIANS IN THEIR LINE OF WORK.

3. WHEN PERFORMING TESTING AS DICTATED WITHIN THIS MANUAL, DO NOT CONNECT THE UNIT TO A POWER SOURCE UNTIL INSTRUCTED TO DO SO. WHEN THE POWER SUPPLY CABLE MUST BE CONNECTED, USE EXTREME CAUTION IN WORKING ON POWER SUPPLY AND OTHER ELECTRONIC COMPONENTS.

WARNING

1. REPAIRS ON EPSON PRODUCT SHOULD BE PERFORMED ONLY BY AN EPSON CERTIFIED REPAIR TECHNICIAN.

2. MAKE CERTAIN THAT THE SOURCE VOLTAGE IS THE SAME AS THE RATED VOLTAGE, LISTED ON THE SERIAL NUMBER/RATING PLATE. IF THE EPSON PRODUCT HAS A PRIMARY AC RATING DIFFERENT FROM AVAILABLE POWER SOURCE, DO NOT CONNECT IT TO THE POWER SOURCE.

3. ALWAYS VERIFY THAT THE EPSON PRODUCT HAS BEEN DISCONNECTED FROM THE POWER SOURCE BEFORE REMOVING OR REPLACING PRINTED CIRCUIT BOARDS AND/OR INDIVIDUAL CHIPS.

4. IN ORDER TO PROTECT SENSITIVE MICROPROCESSORS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.

5. REPLACE MALFUNCTIONING COMPONENTS ONLY WITH THOSE COMPONENTS BY THE MANUFACTURE; INTRODUCTION OF SECOND-SOURCE ICs OR OTHER NONAPPROVED COMPONENTS MAY DAMAGE THE PRODUCT AND VOID ANY APPLICABLE EPSON WARRANTY.

PREFACE

This manual describes functions, theory of electrical and mechanical operations, maintenance, and repair of LX-105O+.
The instructions and procedures included herein are intended for the experience repair technician, and attention should be given to the precautions on the preceding page. The chapters are organized as follows:

CHAPTER 1. GENERAL DESCRIPTION

Provides a general product overview, lists specifications, and illustrates the main components of the printer.

CHAPTER 2. OPERATING PRINCIPLES

Describes the theory of printer operation.

CHAPTER 3. DISASSEMBLY AND ASSEMBLY

Includes a step-by-step guide for product disassembly and assembly.

CHAPTER 4. ADJUSTMENTS

Includes a step-by-step guide for adjustment.

CHAPTER 5. TROUBLESHOOTING

Provides Epson-approved techniques for adjustment.

CHAPTER 6. MAINTENANCE

Describes preventive maintenance techniques and lists lubricants and adhesives required to service the equipment.

APPENDIX

Describes connector pin assignments, circuit diagrams, circuit board component layout and exploded diagram.

The contents of this manual are subject to change without notice.

REVISION SHEET

Revision	Issue Date	Revision Page
Rev. A	May 18, 1994	1st issue

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Chapter 1 General Description

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1.1 FEATURES

The LX-1050+ is a small, light-weight, low-cost, advanced paper handling printer. Its main features are:

- The LX-1050+ has four versions. Different parts are Program ROM version only.
  Standard version: ROM version SOxxxx
  India version: ROM version Slxxxx
  Russian version: ROM version S2xxxx
  Latin version: ROM version S3xxxx
  South Europe version: ROM version S4xxxx
- Command compatible with following printers.
  Standard, Latin, and South Europe version: with LX-1050
  Russian and India version: with FX-1OOO
- Printing speeds:
  200 cps (draft 10 cpi)
  240 cps (draft 12 cpi)
  40 cps (NLQ 10 cpi)
  48 cps (NLQ 12 cpi)
- PC table support as follows.
  Standard version: Italic, PC437, PC850, PC860, PC863, PC865
  India version: Italic, PC437
  Russian version: Italic, PC437, PC866, PC855, Bulgaria
  Latin version: Italic, PC437, PC852, MAZOVIA, codeMJK
  South Europe version: Italic, PC437, PC857, 1S0 Latin IT, PC437 Greek, PC869, 1S0 8859-7
- Two built-in NLQ (Near Letter Quality) fonts (Roman and Saris Serif)
- Input buffer size is as follows.
  Standard, Latin, and South Europe version: 4Kbytes
  Russian and India version: 1K bytes
- Optional EPSON TYPE-A interface

Figure 1-1 shows the an exterior view of the LX-1050+.

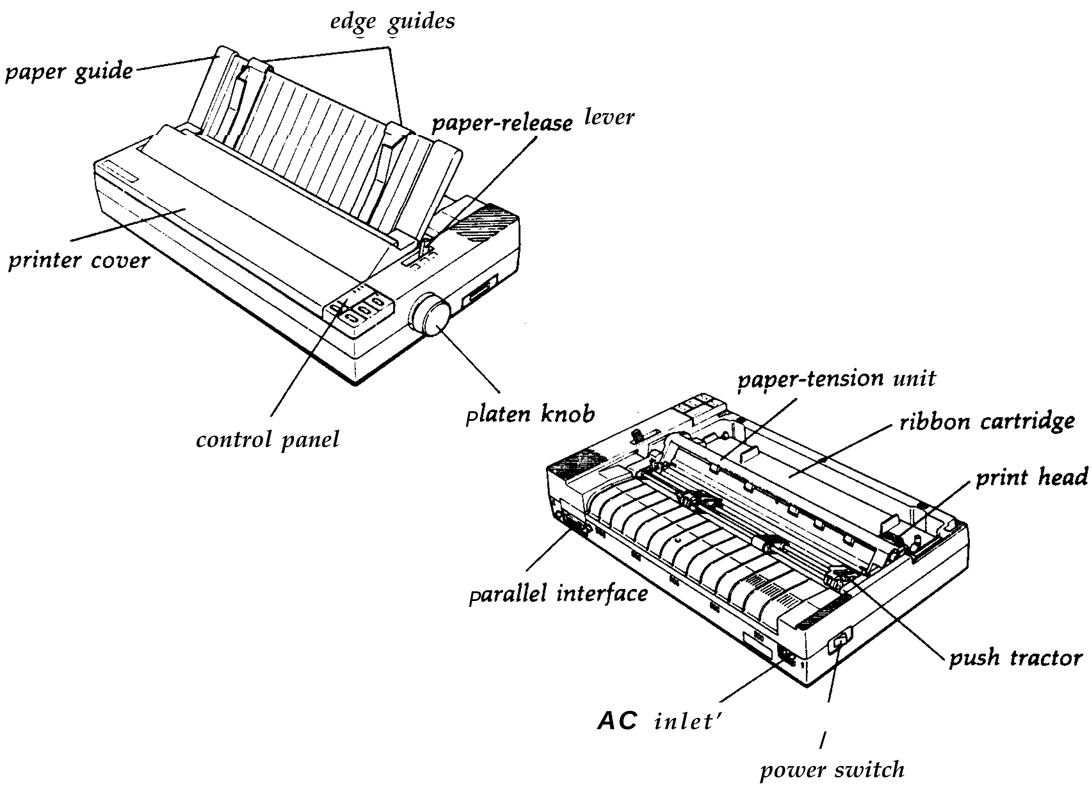


Figure 1-1. Exterior View of the LX-1050+

Table 1-1 lists the optional units available for the LX-1050+.

Table 1-1. Options for LX-1050+

Cat. No.	Description
8143	New Serial Interface Board
C82302*/C82304*	32KB Serial Interface
C82303*	32KB Parallel Interface
8165	IEEE-488 Interface Board
C80624*	Single Bin Cut Sheet Feeder
C80014*	Pull Tractor Unit
8755	Ribbon Cartridge

1.2 SPECIFICATIONS

This section provides detailed statistics for this printer.

1.2.1 Printing Specification

Printing Method: Serial, impact, dot matrix
Pin Configuration: 9 wires (diameter 0.29rnm)

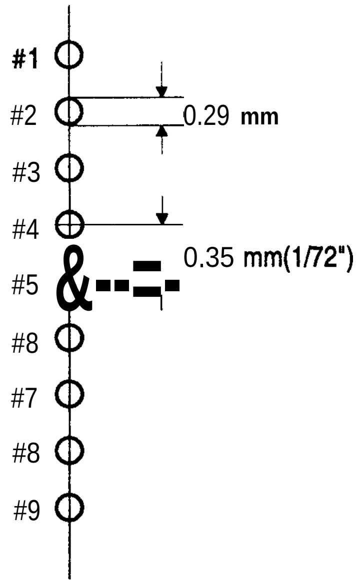


Figure 1-2. Pin Configuration

Print direction: Bi-directional printing with logical seeking (Text mode)
Uni-directional (left to right) printing (Bit image mode)
Print speed: See Table 1-2.
Printable columns See Table 1-2.

Table 1-2. Print Speed and Printable Columns

Type of Letters	Printable Columns	Print Speed
Pica (10 cpi)	136	200 cps
Elite (12 cpi)	163	240 cps
Double-width pica	68	100 cps
Emphasized pica	136	100 cps
Double-width emphasized pica	68	50 cps
Condensed pica (17 cpi)	233	171 cps
Double-width condensed pica (17 cpi)	115	86 cps
Double-width elite	81	120 cps
Condensed elite (20 cpi)	272	200 cps
NLQ pica (1 O cpi)	136	40 cps
NLQ elite (12 cpi)	163	48 cps

lot matrix format: 9 X 9 Text mode (Draft)
18X 20 Text mode (NLQ

Character sets: 13 international character sets

Character tables: See Table 1-3.

Table 1-3. Character Tables

Character Table	Standard Model	India Model	Russian Model	Latin Model	South Europe Model
ITALIC	o	0	0	0	0
PC437 (US/ Standard Europe)	o	0	0	0	0
PC850 (Multilingual)	o	x	x	x	x
PC860 (Portuguese)	o	x	x	x	x
PC863 (Canadian-French)	o	x	x	x	x
PC865 (Nordic)	o	x	x	x	x
PC866 (Russian)	x	x	o	x	x
PC855 (Cyrillic)	x	x	o	x	x
PC852 (East Europe)	x	x	x	o	x
PC857 (Turkish)	x	x	x	x	o
PC437 Greek	x	x	x	x	o
PC869 (Greek)	x	x	x	x	o
Bulgaria	x	x	o	x	x
MAZOVIA (Poland)	x	x	x	o	x
Code MJK (CSFR)	x	x	x	o	x
ISO Latin IT (Turkish)	x	x	x	x	o
ISO 8859-7 (Latin/Greek)	x	x	x	x	o

Font: Draft, NLQ Roman, NLQ Saris Serif

Control code: ESC/P-81
Standard, Latin, and South Europe model compatible with LX-1050
India and Russian model compatible with FX-1OOO (except IBM mode)

Input buffer: Standard, Latin, and South Europe model: 4K bytes
India and Russian model: 1K bytes

1.2.2 Paper Handling Specification

Line spacing:	1/6 inch or 1/8 inch, or programmable in units of 1/216 inch
Line feed speed:	Approximately 95 ms (1/6 inch line feed) Approximately 75 ms (1/6 inch in page feed)
Paper feed method:	Friction feed Tractor feed (push tractor: standard, pull tractor: optional)
Paper insertion:	Rear

1.2.3 Paper Specification

Useable paper:

<Cut sheet>	Width: 182 to 364 mm (4 to 14.3 inch) Length: 182 to 364 mm (4 to 14.3 inch) Thickness: 0.065 to 0.14 mm (0.0025 to 0.055 inch) Weight: 45 to 78 Kg (14 to 24 lb)
<Continuous paper>	Width: 101 to 406.4 mm (4 to 16 inch) Copies: 3 sheets (1 original 2 copies) Total thickness: 0.065 to 0.25 mm (0.0025 to 0.010 inch) Weight: 45 to 70 Kg (14 to 22 lb) 34 to 50 Kg (12 to 15 lb)-- copy paper
<Envelope>	Size: No. 6 (166X 92 mm), No.1O (240X 104 mm) Total thickness: 0.16 to 0.52 mm (0.0063 to 0.0197 inch) Weight: 39 to 78 Kg (12 to 24 lb)
<Label>	Size: 63.5 X23.8 mm (2.5 inch X 15/16 inch)
Printing Area:	Cut sheet

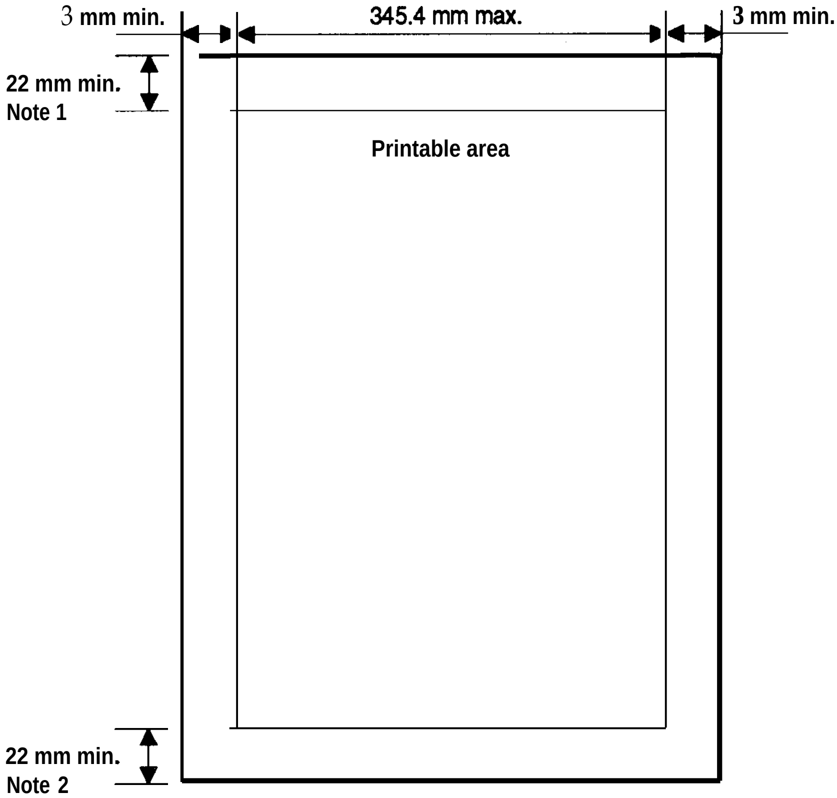


Figure 1-3. Printable Area - Cut Sheet

Notes:
1. *In the area from 8.5 mm to 22 mm from the top of paper, it is printable but paper-feed is not assured.*
2. *In the area from 13.5 mm to 22mm from the bottom of the paper, it is printable but paper-feed is not assured.*

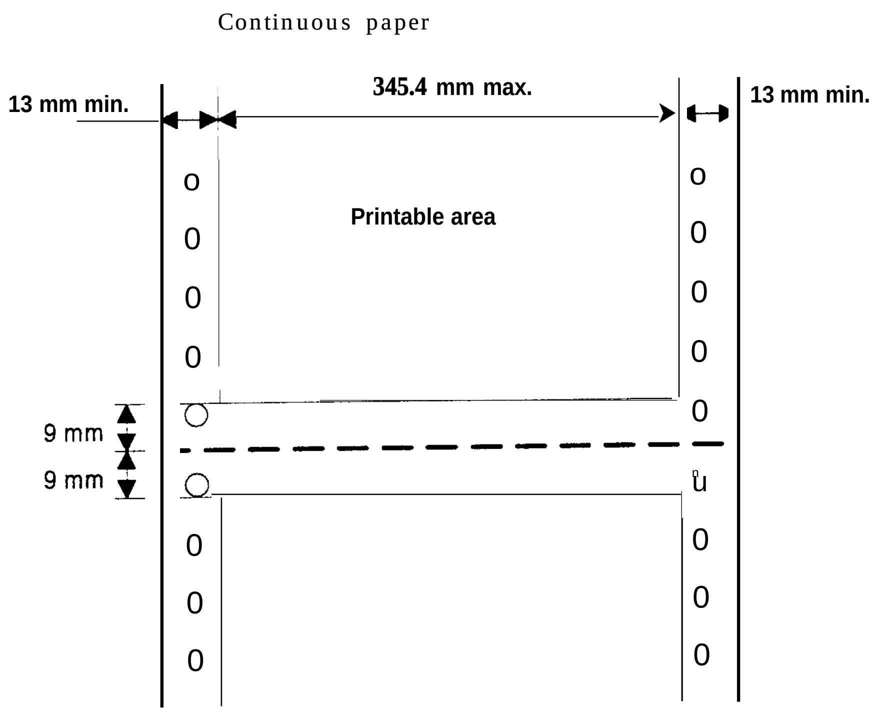


Figure 1-4. Printable Area - Continuous Paper

Adjust lever settings

The adjust lever must be set to the proper position for the paper thickness.

Table 1-4. Adjust Lever Settings

Lever position	Paper Thickness
2nd step	0.06 to 0.18 mm
3rd step	0.19 to 0.25 mm

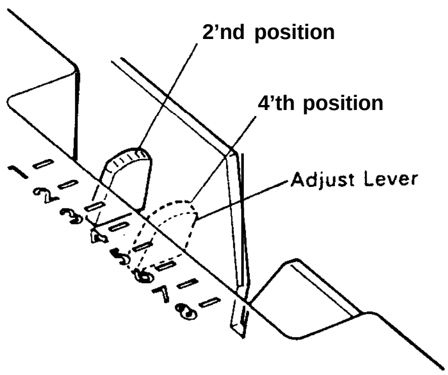


Figure 1-5. Adjust Lever Position

1.2.4 Ink Ribbon

Type: #8755 Ribbon Cartridge

Color: Black

Reliability: 3 million characters at 14 dots/character

1.2.5 Environmental Conditions

Temperature:
-30 to60"C - Storage
5to35"C - Operation

Humidity:
5 to 85 %RH (no condensation) - Storage
10to801%0 RH (no condensation) - Operation

Resistance to shock:
2 G, 1 ms - Storage
1 G, 1 ms - Operation

Resistance to vibration:
0.50 G (55 Hz max.) - Storage
0.25 G (55 Hz max.) - Operation

1.2.6 Electrical Specifications

Table 1-5. Electrical Specifications

Item	120V Version	220- 240V Version
Rated voltage	120 V AC	220- 240V AC
Input voltage range	103.5 to 132V	198 to 264V
Rated frequency range	50 to 60 Hz	50 to 60 Hz
Input frequency range	49.5 to 60.5 Hz	49.5 to 60.5 Hz
Power consumption	Approx. 28W (Self test in draft 10 cpi)	Approx. 28W (Self test in draft 10 cpi)
Insulation resistance	10 MΩ, min. (between AC line and chassis)	10 MΩ, min. (between AC line and chassis)
Dielectric strength	AC 1000 V rms 1 minute or AC 1200 V rms 1 second	AC 1250 V rms 1 minute or AC 1500 V rms 1 second

1.2.7 Reliability

MCBF: 3 million lines (except printhead)

MTBF: 6000 POH

Life of Printhead: 200 million strokes/wire

1.2.8 Safety Approval

Safety Standards:
UL4785th(U.S. version)
CSA22.2 #220. (U.S. version)
VDE 0806 (TUV) (European version)

RFI:
Vfg.243 (VDE 0878 part 3, part 30)
EN 55022 (CISPR Pub.22) class B"

1.2.9 Physical Specifications

Dimensions: 619.3 mm (Width) x 339 mm (Depth) x 141 mm(Height), excluding knobs

Weight: 8.80 Kg

1.3 INTERFACE OVERVIEW

The LX-1050+ is equipped with the following external interfaces;

- Centronics parallel interface
- Optional Type A interface

1.3.1 Parallel InterFace

Data Format	8-bit parallel
Synchronization	By STROBE pulse
Handshaking	By BUSY and ACKNLG signal
Signal Level	Ill-compatible
Adaptable Connector	57-30360 (amphanol) or equivalent

Table 1-6 shows the connector pin assignments and signal functions of the parallel interface.

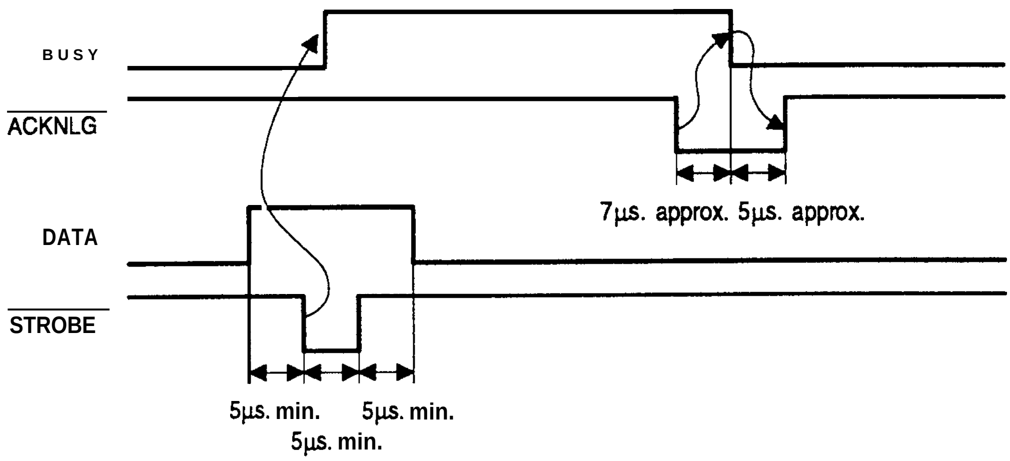


Figure 1-6. Data Transmission Timing

Table 1-6. Connector Pin Assignments and Signal Functions

Pin No.	Signal Name	I/O	Description
1	STROBE	I	The STROBE pulse is used to read data from the host computer. The pulse width must be 0.5µs or more. Normally, it is HIGH, and data is latched with rising edge of this signal.
2-9	DATA 1-8	I	DATA 1-8 are parallel data bits. When one of these signals is HIGH, the data bits is 1; when LOW, the data bits is O. The most significant bit (MSB) is data 8. The signal state must be maintained for 0.5µs on either side of STROBE signal's active edge.
10	ACKNLG	O	ACKNLG is an acknowledge pulse with a width of approximately 10P.s. This signal goes LOW upon the completion of data reception, to indicates that the printer is ready to receive further data.
11	BUSY	O	The BUSY signal informs the host computer of the printer's status. When this signal is HIGH, the printer cannot accept further data.

Table 1-6. Connector Pin Assignments and Signal Functions (Cont.)

Pin No.	Signal Name	I/O	Description
12	PE	O	This signal indicates whether paper is available in the printer or not. A HIGH level indicates a no paper condition.
13	SLCT	O	Pulled up to +5V through 3.3KΩ resistor in the printer.
14	$\overline{\text{AUTO FEED XT}}$	I	If this signal is set to LOW, the printer automatically performs one line feed upon receipt of a CR (carriage return) code.
15	NC		Not used.
16	GND		Signal ground
17	CHASSIS GND	-	Chassis ground.
18	NC	-	Not used.
19-30	GND		Twisted-pair return signal ground.
31	INIT	I	If this signal goes LOW, the printer is initialized. The pulse width of this signal must be 50µs or more.
32	$\overline{\text{ERROR}}$	O	This signal goes LOW if the printer: - has a fatal error. - runs out of paper. - off line.
33	GND		Signal ground.
34	NC		Not used
35	+5V		Pulled up to +5 V through 3.3 KΩ resistor in the printer.
36	$\overline{\text{SLCT IN}}$	I	The DC1/DC3 code is only valid when this signal is HIGH.

Notes: *All interface conditions are based on TTL levels. Both the rise and fall times of all signals must be less than* 0.2 µs.
The AUTO FEED-XT signal can be set LOW by DIP switch 2-4.
The SELECT IN signal can be set LOW by jumper 1.

1.3.2 Optional Interface #8143

The LX-1050+ can use the non-intelligent serial interface board #8143.

Tyep: RS-232C or current loop

Synchronization: Asynchronous start-stop system
- Start bit: 1 bit
- Stop bit: 1 bit or more
- Data length: 7 or 8 bits
- Parity: Odd, Even or none

Protocol: X-ON/X-OFF or DTR control

Transfer speed: 75,110,134.5,150,200, 300,600,1200,1800,2400, 4800, and 9600

1.4 PRINTER OPERATIONS

This section describes the basic operations of the printer.

1.4.1 Control Panel

The control panel of this printer contains four non-lock type push buttons and four LED indicators for easy operation of the various printer function.

[Buttons]

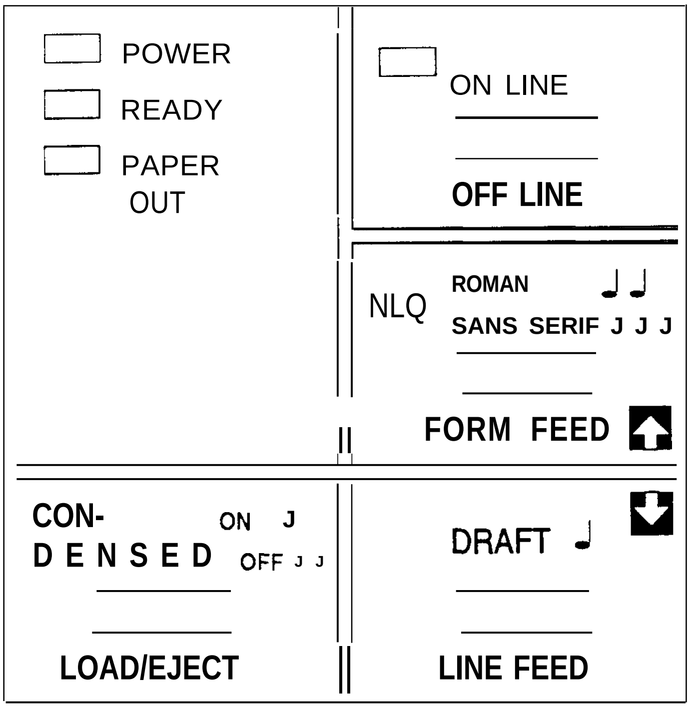


Figure 1-7. Control Panel

ON LINE: Switches printer status between on line and offline.

FORM FEED: When the printer is off line, press this button to eject a single sheet of paper or to advance continuous paper to the top of the next page.

LINE FEED: When the printer is off line, press this button to advance the paper one line, or hold it down to advance the paper continuously.

LOAD/EJECT: This button is used to feed the paper to the loading position, or to eject paper that is already loaded. Paper is ejected forward if the paper-release lever is set to the single-sheet position, or is ejected backward (removed from the paper path) if the release lever is set to the continuous paper position.

[Indicators]

POWER: On when the power switch is on and power is supplied.

READY: On when the printer is ready to accept input data. Flickers while data is printed.

PAPER OUT: On when the printer is out of paper or when continuous paper ia in a standby position. The printer also beeps when it is out of paper.

ON LINE: On when the printer is on line and ready to accept data from the computer. When this indicator is blinking, the micro-adjustment feature can be used.

1.4.2 SelecType Functions

SelecType allows the user to choose fonts and the printing mode easily. This function provides for selection of Draft, Roman, or Saris Serif fonts and selection of normal printing or condensed printing modes. SelecType is effective only when the printer is ON LINE and not printing.

To select Roman or Saris Serif, press the NLQ button. A buzzer sounds when the NLQ button is pressed. When it sounds twice, the Roman font is selected. When it sounds three times, the Saris Serif font is selected.

To select the Draft font, press the DRAFT button. The buzzer will sound once, indicating that the DRAFT font is selected.

To set for condensed printing when the printer is in the print mode, press the CONDENSED button once (the buzzer will sound once), and the printer will enter the condensed print mode.
To cancel condensed printing, press the CONDENSED button again. After you press the button, the buzzer sounds twice to tell you that condensed printing is canceled.

1.4.3 Micro Adjustment

By pressing the FORM FEED or LINE FEED buttons immediately after loading paper or when using the tear-off feature, you can make tine adjustment to the loading and tear-off positions.

1.4.4 Panel Operation at Power ON

The following functions can be activated at power on by holding down the specified button on the control panel.

Self-test mode:	To begin printing the self-test in the Draft mode, turn the printer ON while pressing the LINE-FEED button. To begin printing the self-test using the NLQ mode (Near Letter Quality), press FORM FEED and hold it down, then turn the printer power ON. Self-test printing can be stopped or started by pressing ON-LINE (ON-LINE indicator is not lit). To finish the self-test, stop the printing by pressing the ON-LINE switch then turn OFF the printer power. The firmware revision number is printed as the first line of the self-test, and subsequently, current DIP switch settings are printed.
Hex Dump mode:	The printer enters the HEX-DUMP mode when it is powered on while the LINE-FEED and FORM-FEED buttons are pressed down. In the HEX-DUMP mode, the hexadecimal representation of the input data is printed out, along with corresponding ASCII characters. This function is valuable for checking the data the printer has received from the host. If input data is a control code rather than a character code, a period (.) is printed in the ASCII column.

1.4.5 DIP Switch Settings

The two DIP switches are located on the side of the printer and function as shown in Tables 1-7 through 1-10. Note that the status of the DIP switches is read only at power on or upon receipt of the INIT signal.

Table 1-7. Settings for DIP Switch

SW No.	Description	ON	OFF	Factory Settings
1-1	Character Pitch	12 cpi	10 cpi	OFF
1-2	Shape of Zero	0	0	OFF
1-3 1-4	Page length	See Table 1-10.		OFF OFF
1-5	Table selection	Graphics	Italics	OFF
1-6 1-7 1-8	Character table selection	See Table 1-8 or 1-9.		ON ON ON
2-1	Short tear-off	Invalid	Valid	OFF
2-2	Cut sheet feeder control	Valid	Invalid	OFF
2-3	Skip over perforation	1 inch	None	OFF
2-4	AUTO FEED XT signal internally fixed or not	Fixed to LOW	Depends on external signal	OFF

Table 1-8. International Character Set Selection (DIP SW 1-5: OFF)

Sw 1-6	Sw 1-7	Sw 1-8	Country	Sw 1-6	Sw 1-7	Sw 1-8	Country
ON	ON	ON	U.S.A	OFF	ON	ON	Denmark
ON	ON	OFF	France	OFF	ON	OFF	Sweden
ON	OFF	ON	Germany	OFF	OFF	ON	Italy
ON	OFF	OFF	U.K.	OFF	OFF	OFF	Spain

Table 1-9. Character Table Selection (DIP SW 1-5: ON)

Sw 1-6	Sw 1-7	Sw 1-8	Standard Version	India version	Russian Version	Latin Version	South Europe Version
ON	ON	ON	PC437	PC437	PC437	PC437	PC437
ON	ON	OFF	PC850	PC437	PC866	PC852	PC857
ON	OFF	ON	PC860	PC437	PC869	MAZOWIA	ISO Lat. IT
ON	OFF	OFF	PC863	PC437	Bulgaria	Code MJK	PC437G.
OFF	ON	ON	PC865	PC437	PC437	PC437	PC869
OFF	ON	OFF	PC437	PC437	PC437	PC437	1S088597
OFF	OFF	ON	PC437	PC437	PC437	PC437	PC437
OFF	OFF	OFF	PC437	PC437	PC437	PC437	PC437

Table 1-10. Page Length Selection

SW 1-3	SW 1-4	Page Length
OFF	OFF	11 inch
ON	OFF	12 inch
OFF	ON	8.5 inch
ON	ON	70/6 inch

1.4.6 Buzzer Operation

The buzzer sounds under the following conditions:

BEL code:	The buzzer sounds for 0.1 second when a BEL code is input.
Carriage trouble:	Beeps 6 times, pausing briefly after 3rd beep.
Paper-out:	Beeps 20 times, pausing briefly after every 4 beeps.
Abnormal voltage:	Beeps 5 times, pausing after every beep.
Incorrect SRAM:	Beeps 8 times, pausing briefly after every 2 beeps.
Incorrect RAMinside CPU:	Beeps indefinitely until power OFF.
Recognition of panel operation:	Beeps 1 or 2 or 3 times in setting print mode.
Factory setting:	Beeps once when the value under micro-adjusting is equal to the factory-set value.
Sheet ejection failure (in CSF mode):	Beeps 20 times, pausing briefly after every 4 beeps.
Illegal paper release/ unrelease:	Beeps continuously when the paper release lever is changed when the paper is in the paper path. Beeps until the lever is changed again or the paper is completely out of the path.

1.4.7 EEPROM Reset

This printer has EEPROM, it memorized SelecType settings, position of continuous paper, and bi-directional printing adjustment value. EEPROM reset operations are only required after the main board replacement, EEPROM replacement, or printer mechanism replacement.
The EEPROM is cleared, when the printer power on while FF and LOAD/EJECT switches are pressed.

1.5 MAIN COMPONENTS

The main components of the LX-1050+ printers are designed for easy removal and replacement to maintain/repair the printers.
The main components are:

- ❑ TAMA board: Main control board. The CPU on this board controls all main functions.
- ❑ TAPNL-W control panel: Control panel.
- ❑ TAa filter unit: Transformer and filter board.
- ❑ M-3D60: Printer mechanism.

1.5.1 TAMA Main Control Board

The TAMA board is the main controller of this printer. It takes charge of interfacing with the host computer and processing of received print data, as well as control of the whole printer mechanism. This-board consists of the following components.

CPU (2C):	8-bit CPU (PPD781OHG) 15 MHz operation clock
Gate-array (3B):	E05A30 Includes the following functions: - MMU (Memory Management Unit) - IFU (Interface Control Unit) - PCU (1/0 Port Control Unit) - Head control unit
Program ROM (3C):	256 Kbit EPROM or mask ROM
RAM (3D):	64 Kbit PS RAM
EEPROM (1C):	256 bit EEPROM
CR Motor driver (1A):	SLA7020M

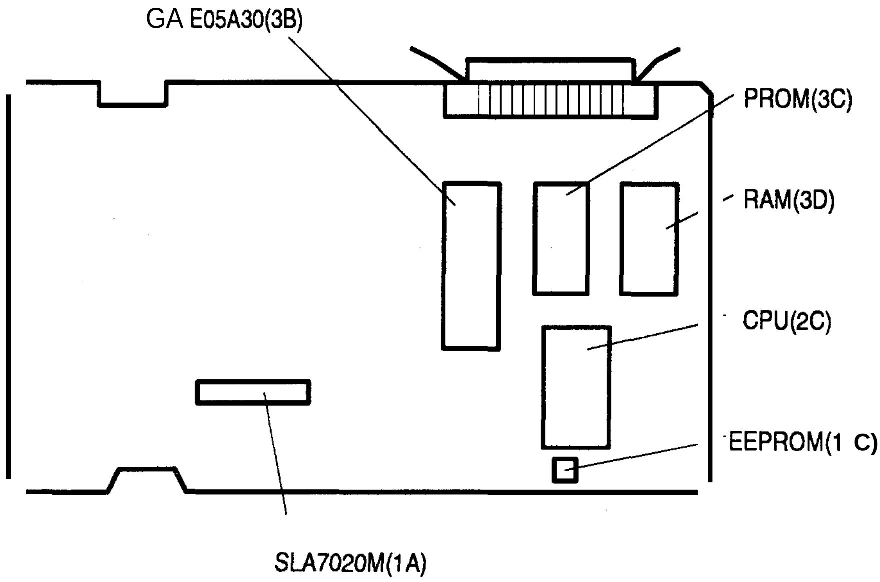


Figure 1-8. TAMA Board Component Layout

1.5.2 TAa Filter Unit

The TAa filter unit contains a power cord (120V Version) or AC inlet (220/240V Version), power switch, fuse filter circuit, and power transformer.

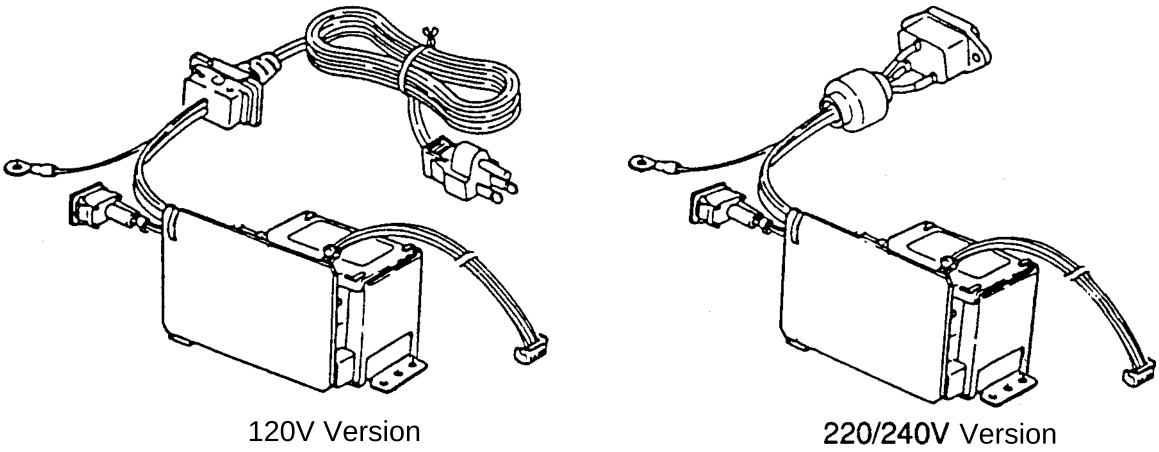


Figure 1-9. TAa Filter Unit

1.5.3 Printer Mechanism (M-3D60)

The M-3D60 printer mechanism was developed specifically for the LX-1050+ printer. Its components include:

Carriage motor
Carriage mechanism
Paper feed motor
Paper feed mechanism
Ribbon feed mechanism
Printhead
Sensors

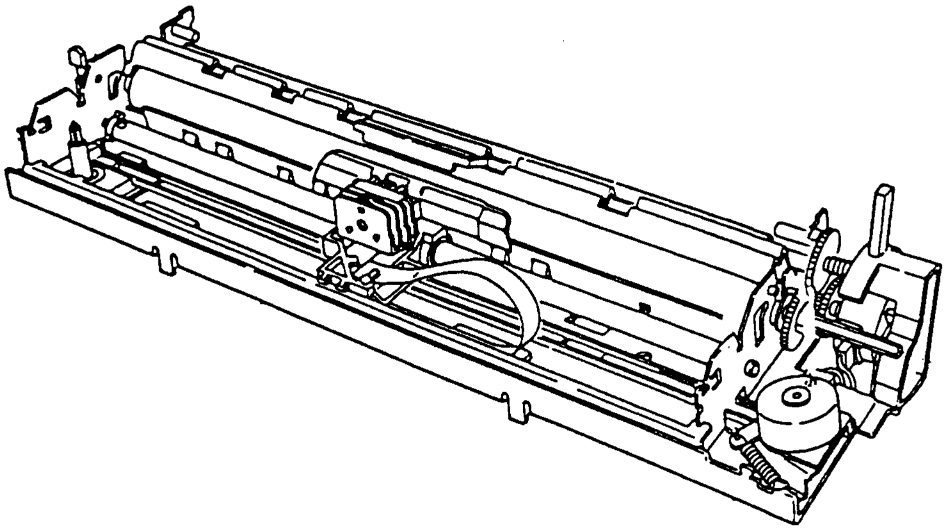


Figure 1-10. Printer Mechanism (M-3D60)

Chapter 2 Operating Principles

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List of Tables

2.1 OVERVIEW

This section describes the operating principles of the printer mechanism and the electrical circuits of the LX-1050+.

2.2 OPERATING PRINCIPLES OF THE PRINTER MECHANISM

The LX-1050+ printer mechanism is composed of the **printhead** unit, paper feed mechanism, carriage drive mechanism, and various sensors. The figure below shows a block diagram of the printer mechanism.

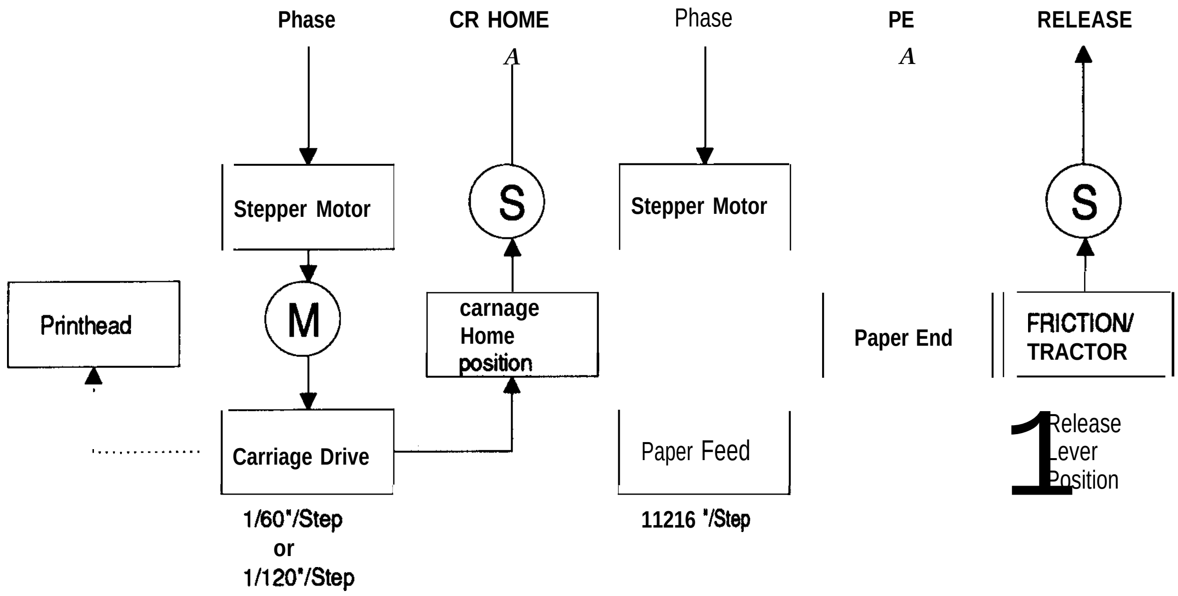


Figure 2-1. Block Diagram of the Printer Mechanism

2.2.1 Printhead Printing Operation

The dot-wire operation during printing is as follows. When the head-driving coil for a dot wire is energized, the actuating plate, which is engaged to one end of the dot wire, is attracted to the iron core, and drives the dot wire toward the platen. The dot wire forcefully pushes both ribbon and paper against the platen, causing a dot to be printed.

When the head-driving coil is deenergized, the actuating plate spring causes the actuating plate to return to its initial position. After striking the platen, the dot wire also returns to its initial position, partly in response to the impact energy, and partly as a result of the wire-resetting spring. The dot wire then remains engaged to the actuating plate until it is driven again.

Printhead specifications areas follows:

Solenoids:	9 solenoids
Wire Diameter:	0.29 mm
Drive Voltage:	24 VDC ± 10Yo
Coil Resistance:	19.2 ± 1.0 Ω at 25° C

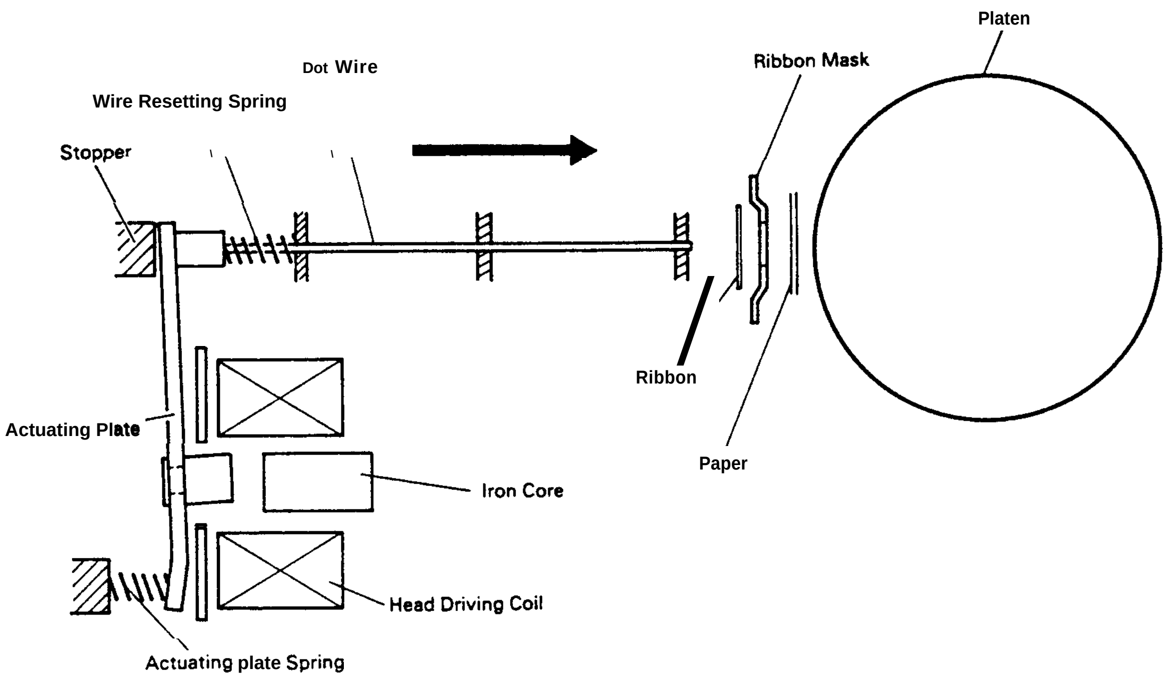


Figure 2-2. Printhead Printing Operation

2.2.2 Carriage Drive Mechanism

The carriage mechanism includes the printhead, the carriage, the timing belt, the carriage motor, and the platen.

The timing belt is connected to the bottom of the carriage. The belt is driven by the carriage motor and moved via the beltdriven pulley. The printhead is mounted on the carriage, and the entire unit is moved right and left along the carriage guide shaft and plate.

Carriage motor specifications are as follows:

Type:	4-phase, 48-pole step motor
Drive Voltage:	24 V ± MY/o
Coil Resistance:	11 Ω ± 7% at 25°C
Current Driving:	0.36 A ± 10%(Typical) (Draft Printing) 0.28 A ± 10%(Typical) (NLQ Printing) Holding: 0.09 A ± 10%

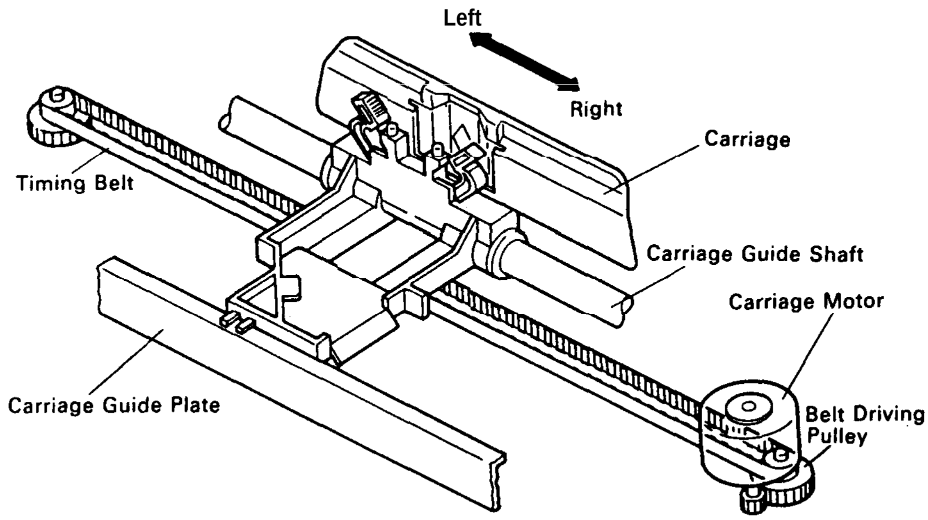


Figure 2-3. Carriage Drive Mechanism

2.2.2.1 Home Position Sensor

Following figure shows the home position sensor. The sensor switch is ON when the carriage is at the home position.

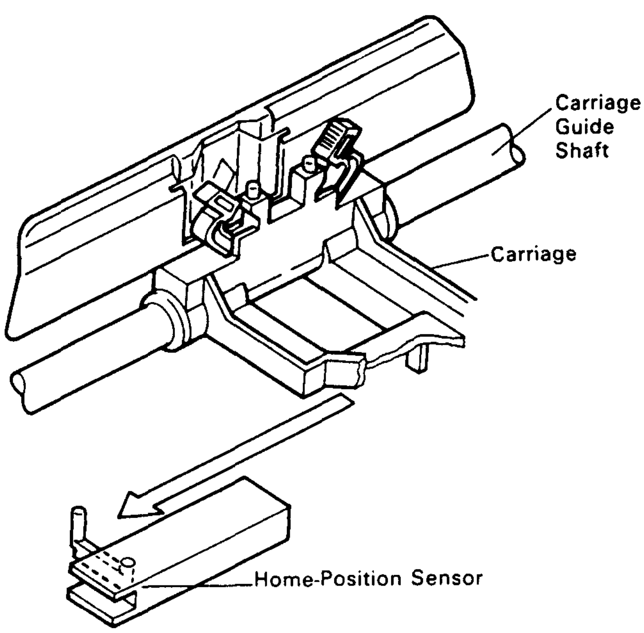


Figure 2-4. Home Position Sensor Mechanism

2.2.3 Paper Feed Mechanism Operation

Friction feeding is used for cut sheets, and push tractor feeding is used for fanfold paper.

Friction-Feed Operation

The paper is held against the platen by paper-feed rollers. The paper-feed motor rotates the platen gear, via the paper-feed reduction gear, in the direction shown in following figure. Because of the friction between the paper-feed rollers and the platen, the rotation of the platen gear causes the paper to be fed. The feeding direction is indicated by the arrow in the Figure.

The paper is held against the platen by the spring force of the paper-feed rollers, and can be released by shifting the paper-release lever forward.

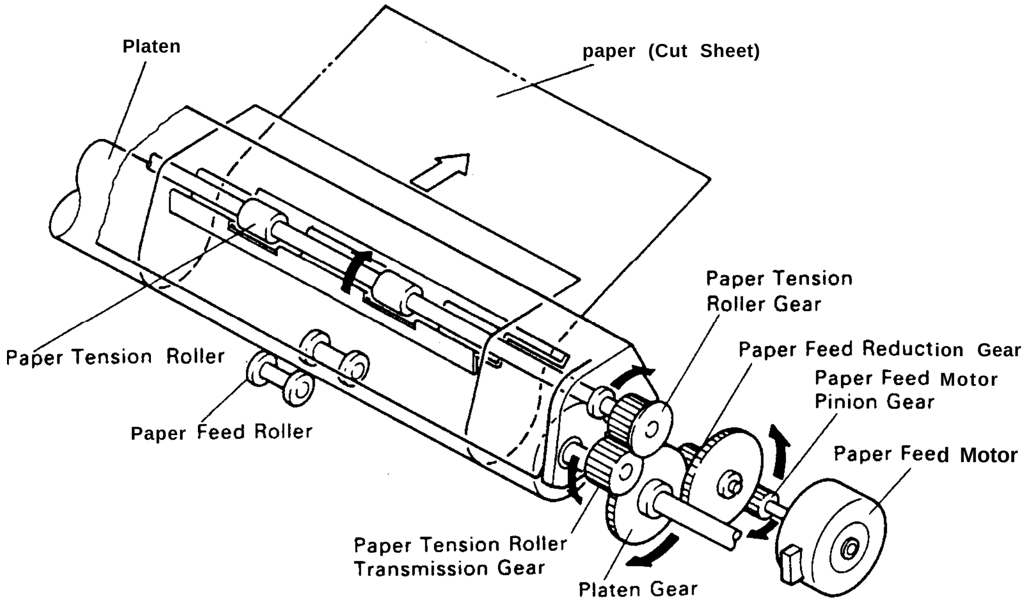


Figure 2-5. Friction Feed Operation

Push Tractor Feed Operation

When the push tractor unit is used, the paper is set such that its holes mesh with the tractor pins along the tractor belt. The paper feed motor is driven and, via the pinion on the motor shaft, rotates the gears in the direction shown in following figure, rotating the tractor belts. This causes the paper advances in the direction indicated by the arrow. When push tractor feeding is used, the pressure of the paper feed rollers against the platen is released by moving the paper release lever to its forward setting.

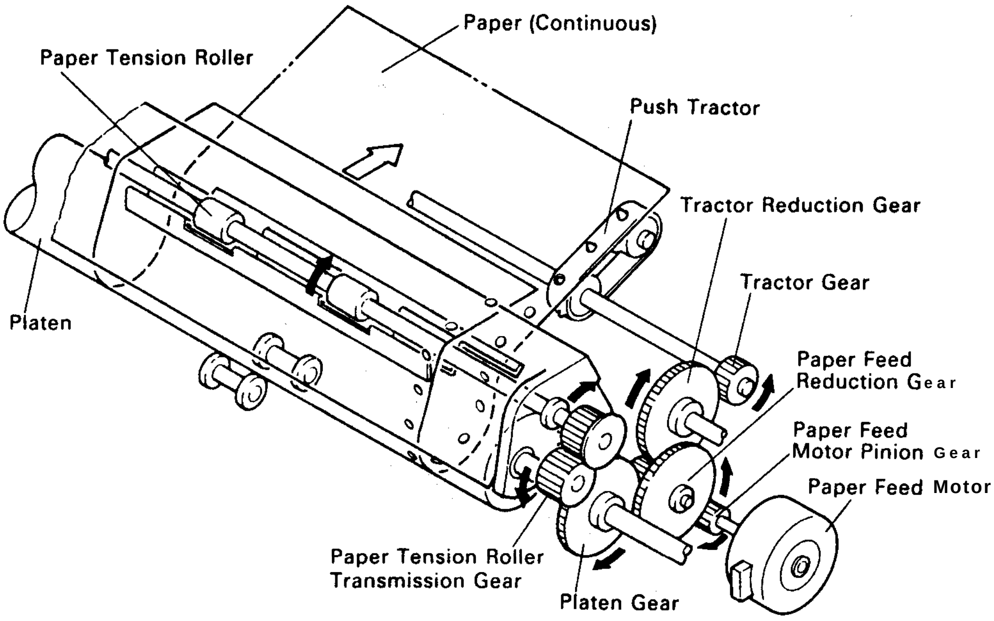


Figure 2-6. Tractor Feed Operation

Paper-feed motor specifications are as follows:

Type:	4phase, 48-pole step motor
Drive Voltage:	24 VDC ± 10Yo
Coil Resistance:	40 ohms* 7% at 25°C
Phase Excitation:	2-2 phase
Current:	Maximum, 1.1A (Rush Current, 26.4 VDC) Driving: 0.30 A (Typ., 480 pps, 24 VDC) Holding: 0.06 A ± 20 mA Driving Frequency: 480 PPS

2.2.3.1 Paper End Sensor

Following figure show the paper end sensor. This sensor switch is ON when no paper is in place (e.g., when the paper supply has run out.).

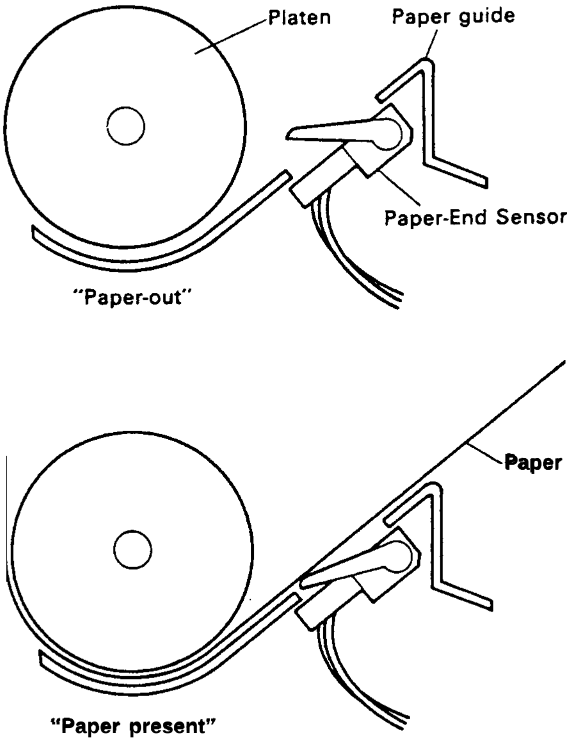


Figure 2-7. Paper End Sensor Mechanism

2.2.3.2 Release Sensor

The release sensor senses the position of the release lever in order to detect whether tractor feed or friction feed is in effect.

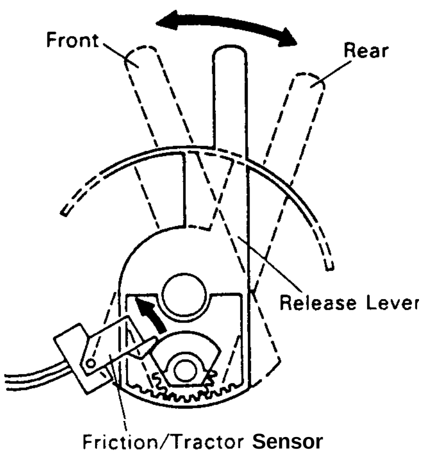


Figure 2-8. Release Sensor Mechanism

2.2.4 Ribbon Advance Mechanism

The ribbon-feed mechanism consists of the ribbon cartridge and the ribbon-feed section. The ribbon-driving gear is always driven counterclockwise (regardless of the timing belt direction) via the gear trains shown in following table.

Table 2-1. Ribbon-Feed Gear Train

Direction of Carriage Movement	Gear Linkage
Left to right (arrow ➨)	Belt-driven pulley-+ Platen gear (1) → Platen gear(2) → Ribbon-driving gear
Left to right (arrow ⇨)	Belt-driven pulley- Platen gear (1) → Platen gear(3) → Platen gear (4) → Ribbon-driving gear

Following figure shows the ribbon-feed mechanism. The inked ribbon is held in the cartridge case between the ribbon-feed and the ribbon-pressure roller mounted on the ribbon-driving gear. The ribbon configuration is such that the ribbon can feed endlessly.

The ribbon-driving gear drives the rollers, which causes the ribbon to be fed.

To prevent ribbon slack, a ribbon-breaking spring is attached at the exit of the cartridge case. A ribbon mask is installed to prevent the ribbon from staining the paper.

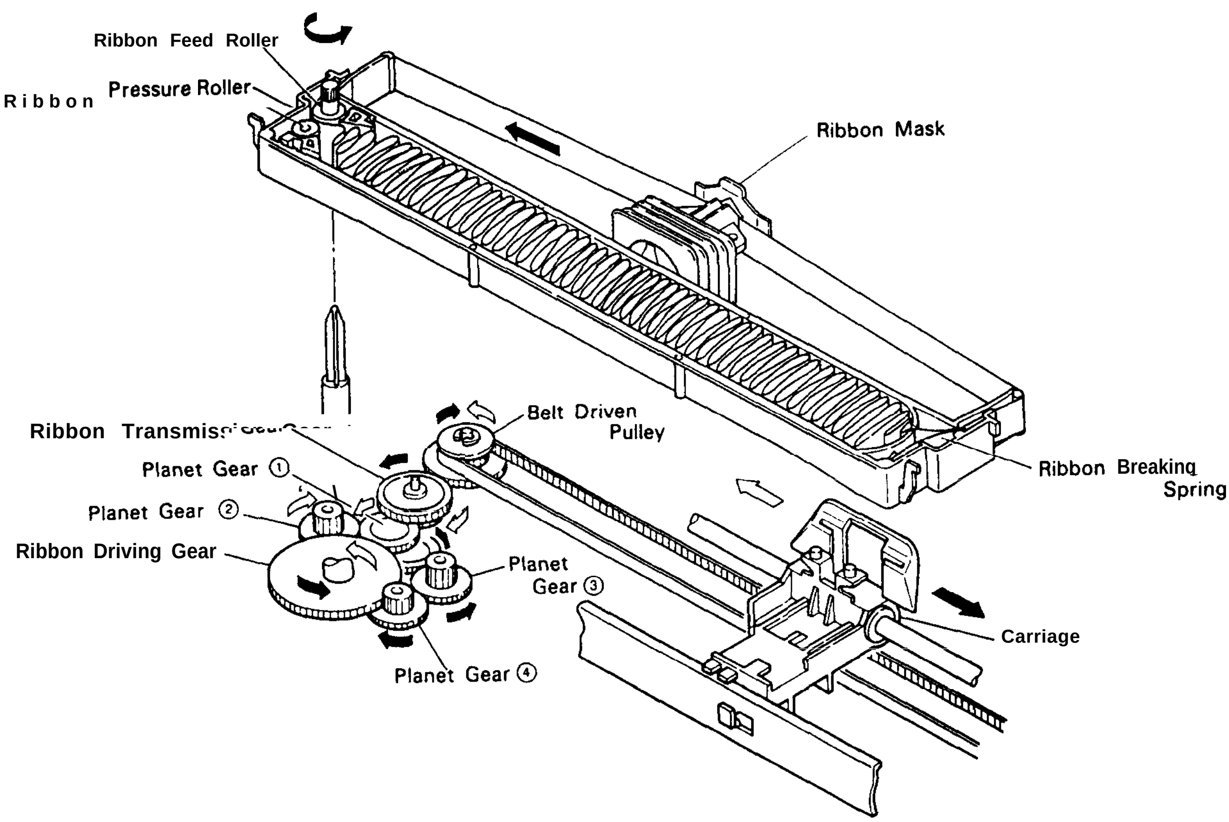


Figure 2-9. Ribbon Feed Mechanism

2.3 OPERATING PRINCIPLES OF THE ELECTRICAL CIRCUITRIES

This section describes principles of electrical circuitries.

2.3.1 Operating Principles of the Power Supply Circuit

The electrical power required by this mechanism is developed using the TAa Filter Unit (which combines a filter and a power transformer) and the TAMA board. The AC input passes first through the filter circuit, where line noise is removed, and is then set to the transformer, where it is stepped down into two separate voltages: AC 26V and AC 12C. The transformer output is sent to the power circuits on the TAMA board, which converts the power to the DC voltages (see below) required for operation.

Table 2-2. Voltage Applications

Voltage	Purpose
+5 VDC	Logic circuit voltage Holding voltage for paper feed motor Others
+24 VDC	Carriage motor drive voltage Paper-feed motor drive voltage Printhead drive voltage
+12 VDC	Voltage for the optional I/F

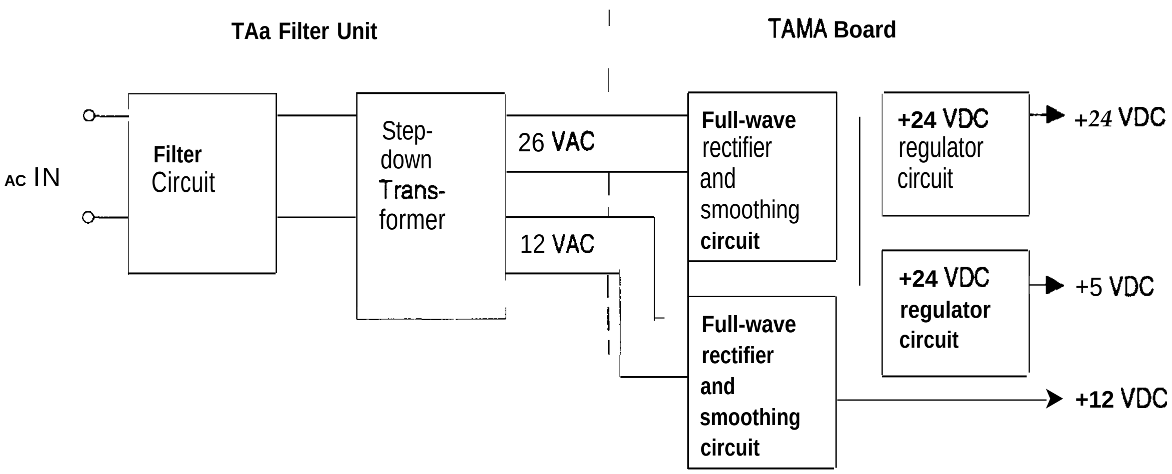


Figure 2-10. Power Supply Circuit Block Diagram

2.3.2 Operating Principles of the Main Control Circuit

The printer CPU is an 8-bit CPU µPD7810HG running at 15 MHz. It oversees control of all the components of the printer. The E05A30 gate array contains various memory management functions that control the assignment of the memory and 1/0 areas.

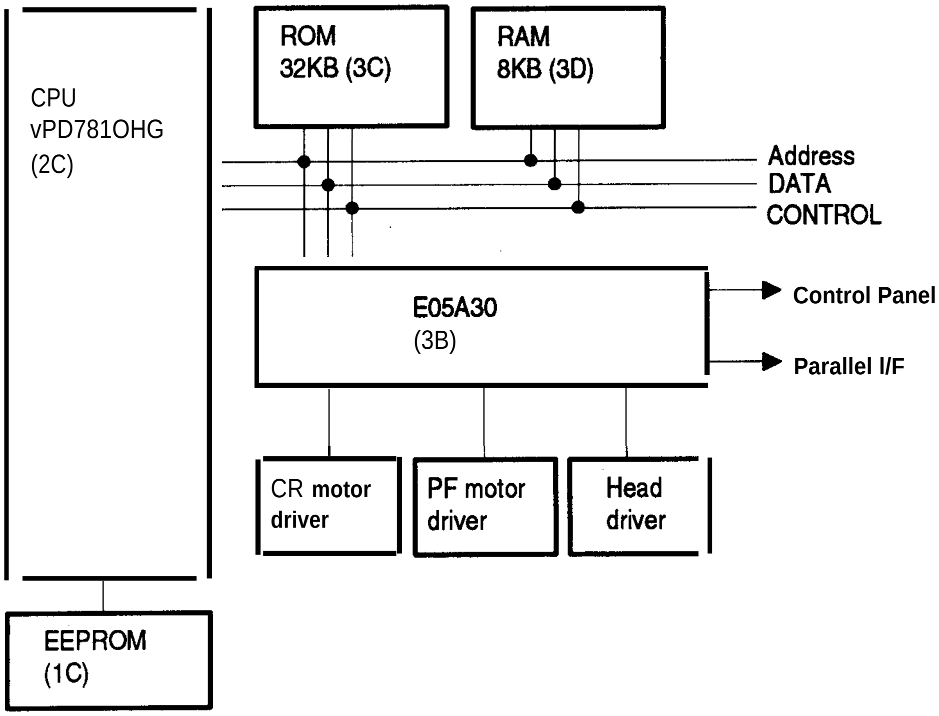


Figure 2-11. Main Control Circuit Block Diagram

Table 2-3 lists the functions of the components and circuits of the printer. The CPU converts the print data sent from the host computer to image data (the print image). The image data is then loaded to RAM. Each line of data is processed sequentially. The CPU transfers the print data to the printhead drive circuit. The CPU sends the printhead drive pulse to the printhead drive circuit. The length of this pulse corresponds to the pnnthead drive voltage. The head drive circuit then outputs the-head drive signal.

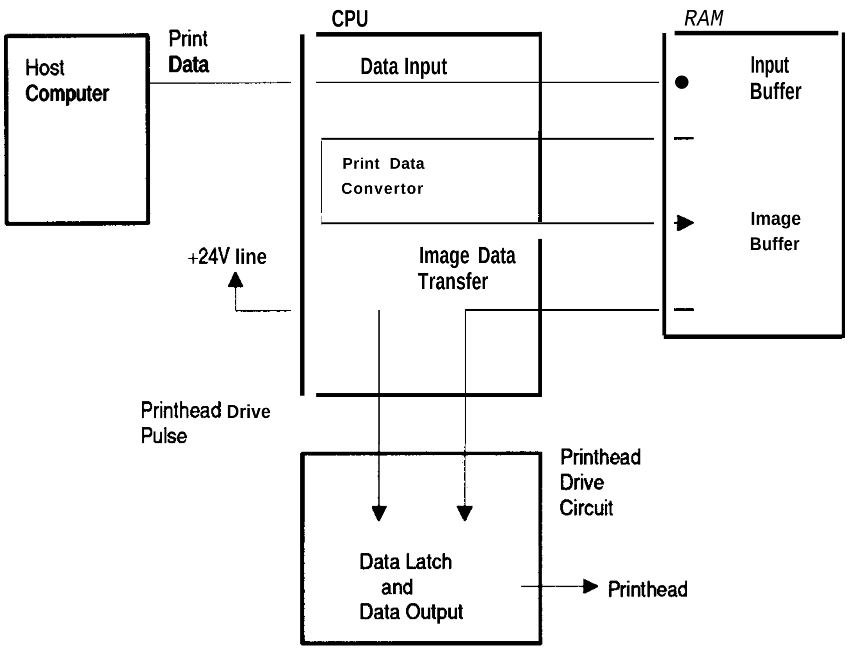


Figure 2-12. Data Flow

Table 2-3. Functions of the Main IC and Circuits

IC and Circuits	Location	Functions
μPD781 OHG	2C	Receives data from the host computer and loads the data to the input buffer in RAM. Expands the input data held in the buffer to create image data. Loads this image data to the image buffer in RAM. Transfers the image data to the printhead drive circuit. Also controls various parts of the printer mechanism, such as the motors.
E05A30	3B	The gate array E05A30 functions areas follows 1. Parallel I/F 2. Address decoder 3. Data address multiplexer 4. PF motor control 5. CR motor control 6. Control panel LED drive 7. Printhead drive control
ROM	3C	This ROM memory program and fonts.
RAM	3D	This RAM is used as an input data buffer and image buffer for expanding data, and as working area for the program.
EEPROM	1C	The EEPROM has a 256-bit memory, and remembers the current paper position.
Paper feed motor drive circuit	—	The paper feed motor drive circuit drives the paper feed motor. The paper feed motor is a 4 phase-step motor. The rotation of the motor (position and speed) is controlled by outputting the phase switching signal by the E05A30 gate array.
Carriage motor drive circuit	—	The carriage motor drive circuit drives the carriage motor. The carriage motor is a 4 phase-step motor. The rotation of the motor (position and speed) is controlled by outputting the phase switching signal by the E05A30 gate array.

2.3.2.1 Reset Circuit

This circuit generates the signal that initializes the printer, and is made by monitoring the +5 and +24V voltages when the power is switched ON and OFF.
The reset signal line is connect to the CPU and gate array 3B.

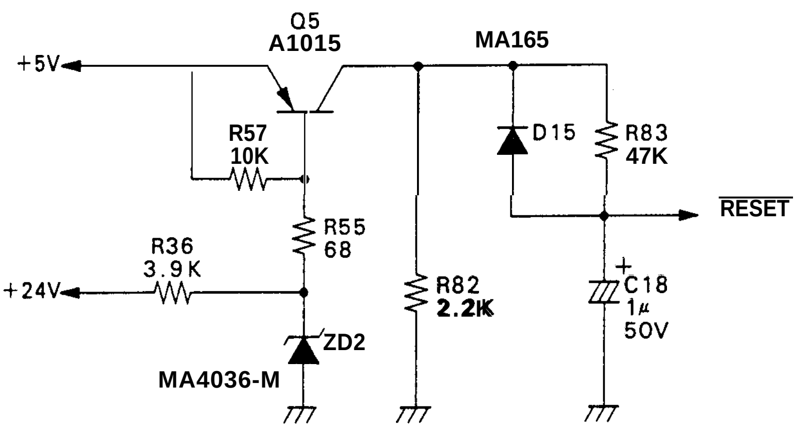


Figure 2-13. Reset Circuit

2.3.2.2 Sensor Circuit

Following figure shows the sensor circuit in block diagram. The PA0 of CPU port senses carriage home position. The PA1 senses paper end. The PA2 senses release lever position. The AN5 of CPU A/D convertor senses +24V line voltage.

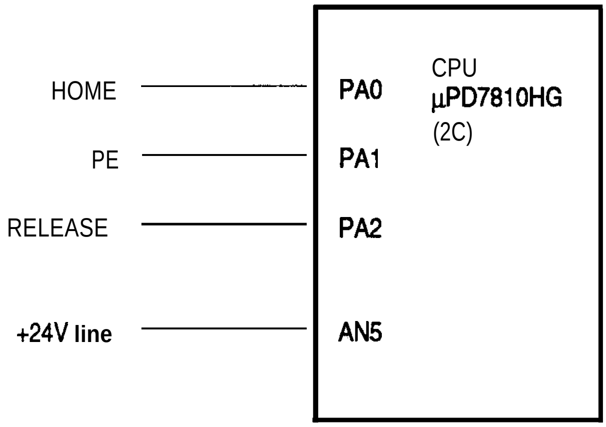


Figure 2-14. Sensor Circuit

2.3.2.3 Carriage Motor Drive

Following figure shows a block diagram of the carriage motor drive circuit. In this circuit, the phase switching for the carnage motor is directly executed not by the CPU, but by the gate array (3B), which acts on the basis of the CPU phase data. SLA7020M drives the carriage motor with a stabilized stabilized current.

The excitation system is determined by the firmware and is executed in accordance with the carriage speed, as shown in Table 2-4.

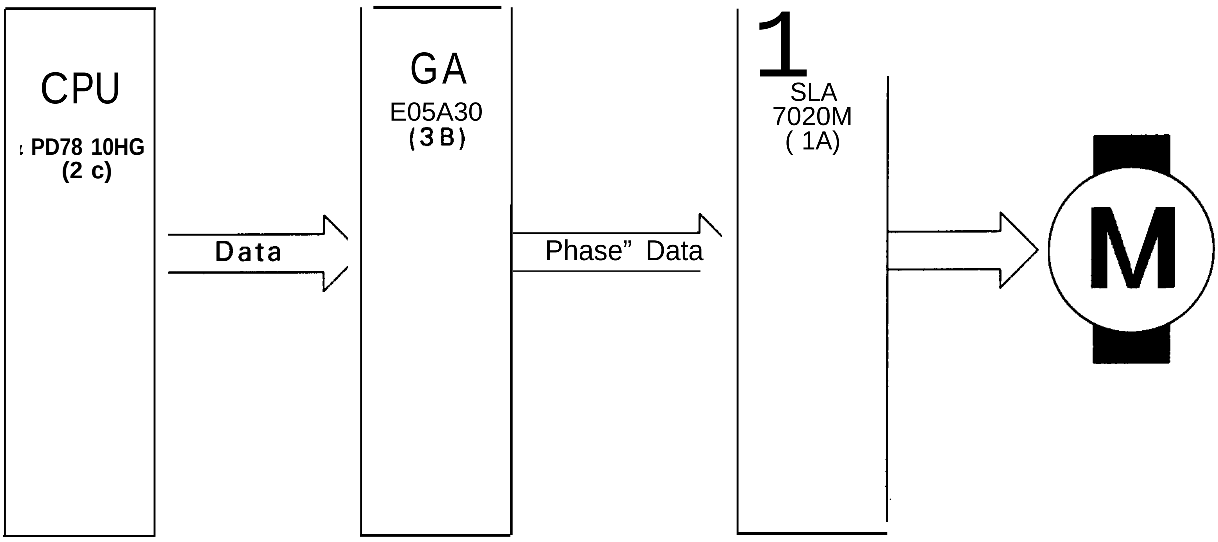


Figure 2-15. Carriage Drive Circuit Block Diagram

Table 2-4. Phase-Excitation Method

Drive Mode	Excitation Type	Drive Frequency Type
Mode 1	2-2 phase	1200 pps
Mode 2	2-2 phase	900 pps
Mode 3	1-2 phase	1200 pps
Mode 4	1-2 phase	900 pps

2.3.2.4 Paper Feed Motor Drive Circuit

The paper-feed motor drive circuit is shown in following figure. The paper-feed motor is a step motor which can utilize 2-2 phase excitation. When the paper-feed signal PC2 is set to HIGH, Q20 and Q16 are turned on, and +24 V is supplied to the motor. When the paper-feed motor is not driven, +5 V is supplied, via resistor R42 and diode D6, to hold the motor.

The paper feed motor is a 48-pole step motor and is open-loop controlled. When 2-2 phase excitation is used to drive the motor, each step feeds the paper a distance of 1/216th inch.

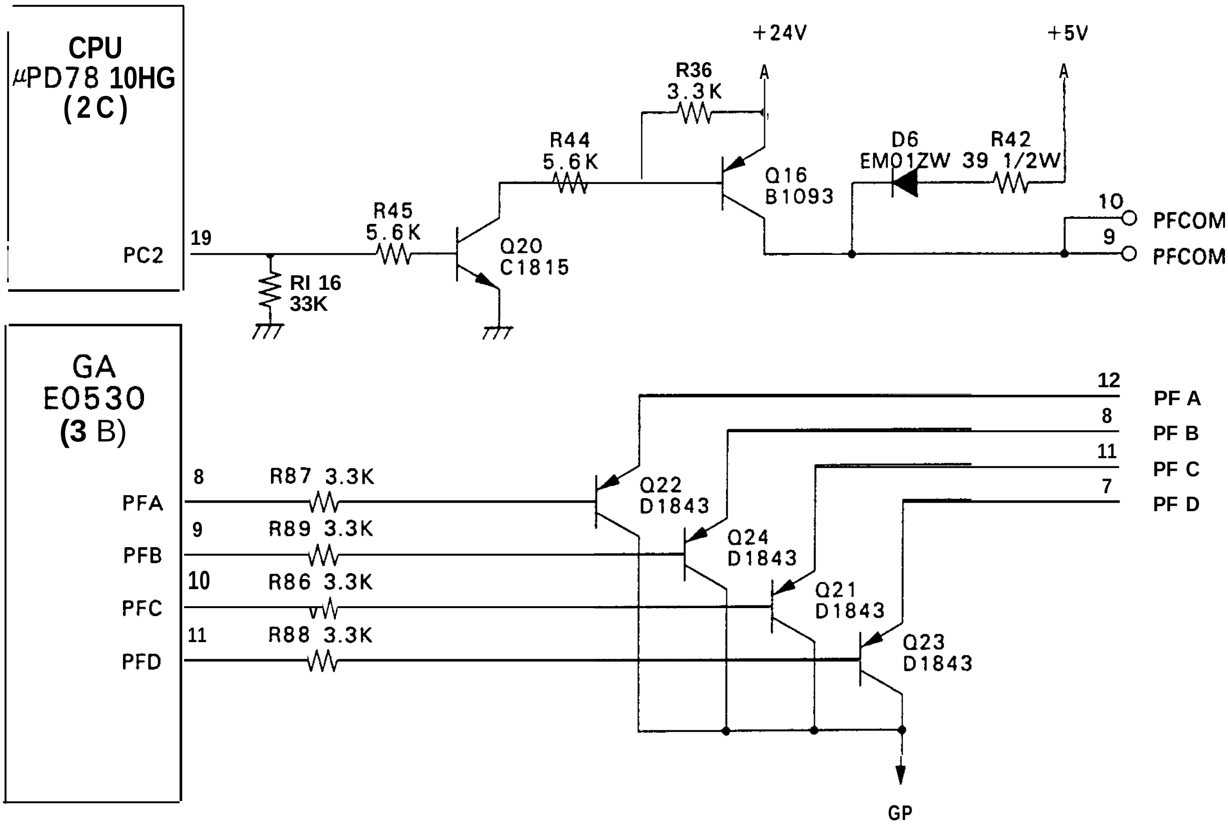


Figure 2-16. Paper Feed Motor Drive Circuit

2.3.2.5 Printhead Drive Circuit

Gate array E05A30 is used as an 8-bit + l-bit data latch. The CPU determines the pulse width for the head-wire drive pulses from gate array E05A30 by monitoring the printhead drive power (+24 V line).

The E05A30 gate array includes circuitry to interface the CPU and the printhead. The data is output to the printhead in the following sequence:
Print data is expanded in the image buffer as dot patterns. The CPU outputs the dot patterns to the E05A30.
The data for pins 1 through 8 of the printhead is latched by HD1 trough HD8 of the E05A30.
The data for pin 9 of the printhead is latched by HD9 of the E05A30.
After data latching, the pnnthead drive pulse width signal FIRE is output from the CPU's event counter. When the signal is LOW, the gate array will be open, so that the data from HD1 through HD9 will be output.

The drive pulse width is adjusted using CPU port PC6.

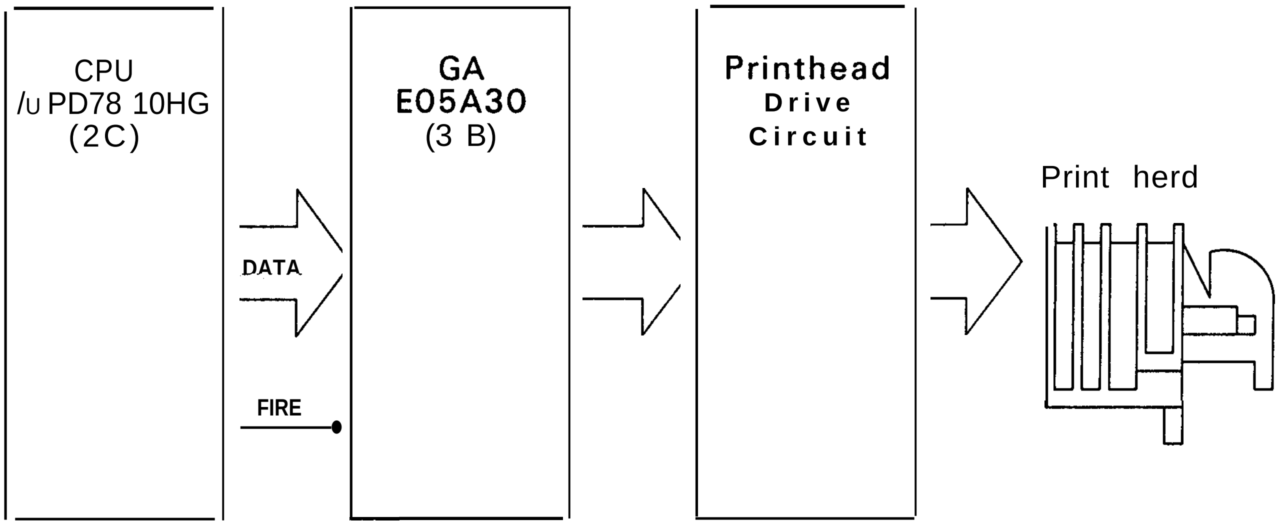


Figure 2-17. Printhead Drive Circuit Block Diagram

2.3.2.6 Host Interface

The host interface circuit is shown in following figure. STROBE pulses from the host computer pass through the low-pass filter, consisting of R72 and C12, and flow into the STROBE terminal.
These pulses latch the parallel data and set the BUSY signal HIGH, so that subsequent data transfer is inhibited.
At this time, the CPU, by reading address 0C002H, can detect whether the data from the computer are latched in the gate array.
When the CPU determines that data have been latched, it proceeds to read the data. After the data have been read, the gate array automatically resets its busy signal.

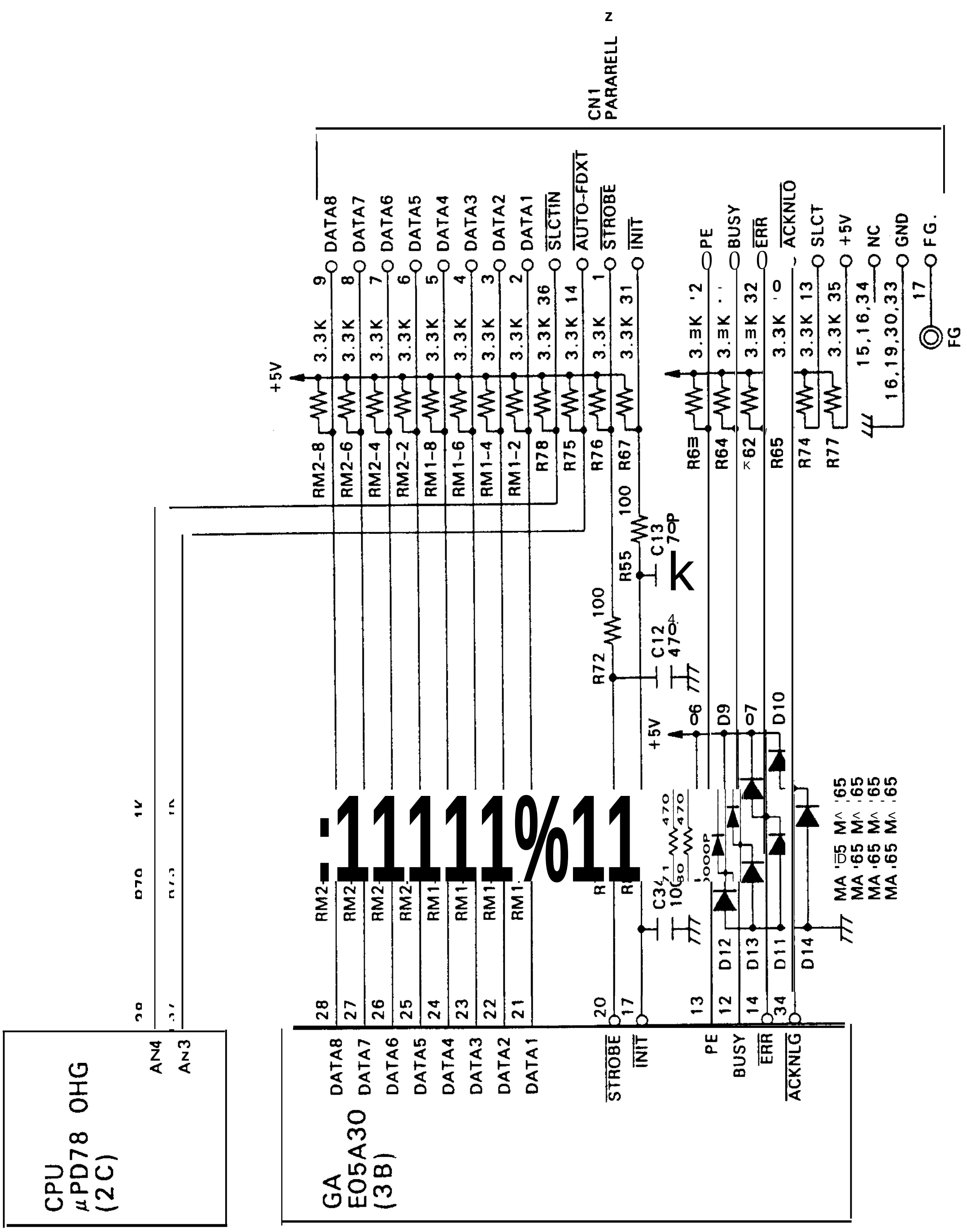


Figure 2-18. Host Interface

2.3.2.7 EEPROM Circuit

The EEPROM stores in its memory the current feed position of continuously fed paper, as well as the current panel settings. This memory is retained even after power is shut off.
EEPROM can memorize the current position of continuously fed paper, so that this information can be maintained even if power goes off.
Following figure shows the EEPROM circuit. Note that this is external to the CPU's memory space.
EEPROM is selected when CPU port PC5 goes HIGH. Once EEPROM has been selected, the data to be sent is set in CPU port PB1, and is fed bit-by-bit to the EEPROM in line with rising pulses from CPU port PC4'S clock. Data are read, bit-by-bit, in line with falling clock pulses.
The EEPROM receives commands to indicate whether to read or write data, and to indicate addresses.

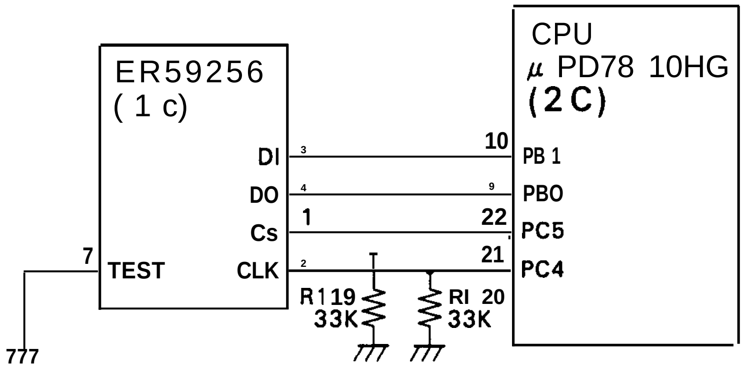


Figure 2-19. EEPROM Circuit

Chapter 3 Disassembly and Assembly

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List of Tables

3.1 GENERAL REPAIR INFORMATION

This chapter describes the procedures for removing, replacing, and adjusting the main components of the LX-1050+.

CAUTION

Prior to beginning any of these procedures, be certain that the AC power cord is disconnected.
To help prevent hands from being cut by the printer mechanism or sharp plate edges, wear gloves when performing these procedures.

WARNING

The printer mechanism, boards, and other parts are sometimes held in place with plastic clips rather than screws. Be careful not to damage these clips when removing them.

Tables 3-1 and 3-2 list tools and measuring instruments recommended for carrying out disassembly and repair.

Table 3-1. Repair Tools

Description	Part No.
Round-nose pliers	B740400100
Nipper	6740500100
Tweezers	B641000100
Electric soldering iron	B740200100
E-ring holder #2.5	6740800400
E-ring holder #5	6740800700
Philips screwdriver No. 2	6743800200
Screwdriver No. O	6743800300
Thickness gauge set (#F518)	B776702201

Table 3-2. Measuring Instruments

Description
Oscilloscope
Muttimeter

To ensure optimal performance of the printer, be sure, following reassembly and adjustment, to lubricate, apply adhesive, clean, and maintain, according to the procedures described in Chapter 6.

3.2 DISASSEMBLY AND ASSEMBLY

This section details the disassembly procedures for the LX-1050+. As a rule, reassembly is performed by simply reversing the procedures; a number of special notes, however, are provided under the heading "Notes for Reassembly." When a disassembly or reassembly procedure requires that an adjustment be performed, the adjustment is described under the heading, "Required Adjustment." Be sure to perform these adjustments as indicated.

WARNING

Be sure that you have read Section 4.1, "General Repair Information," before performing disassembly.
Be sure that paper and ribbon cartridge are removed before disassembly.

The disassembly procedure detailed below is in the following sequence: (1) removal of the printhead, (2) removal of the casings, (3) removal of the circuit boards, (4) removal of the printer mechanism unit, and (5) disassembly of the printer mechanism.

3.2.1 Printhead Removal

[Step 1] Remove the printer cover, and confirm that paper and ribbon cartridge have been removed.

[Step 2] Open the cover of the paper tension unit.

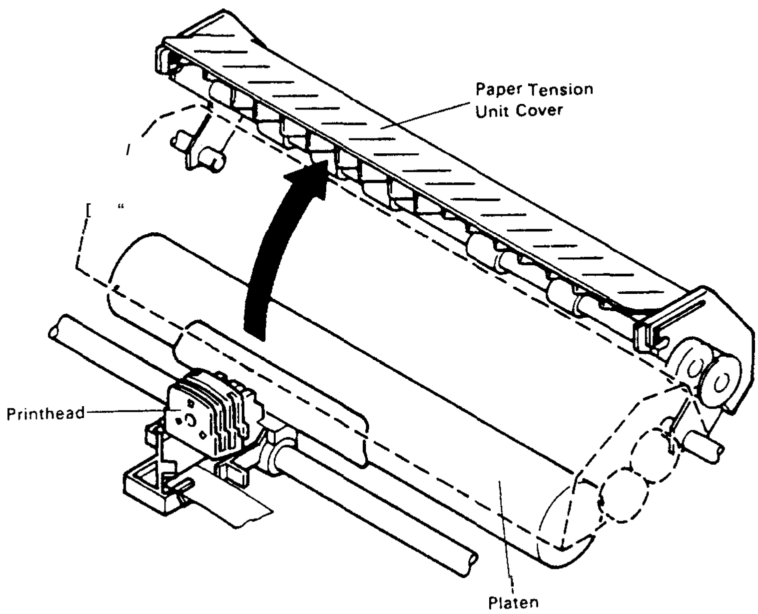


Figure 3-1. Paper Tension Unit Cover

[Step 3] Unlock the two levers securing the printhead to the carriage by pulling them down. Then lift and remove the printhead.

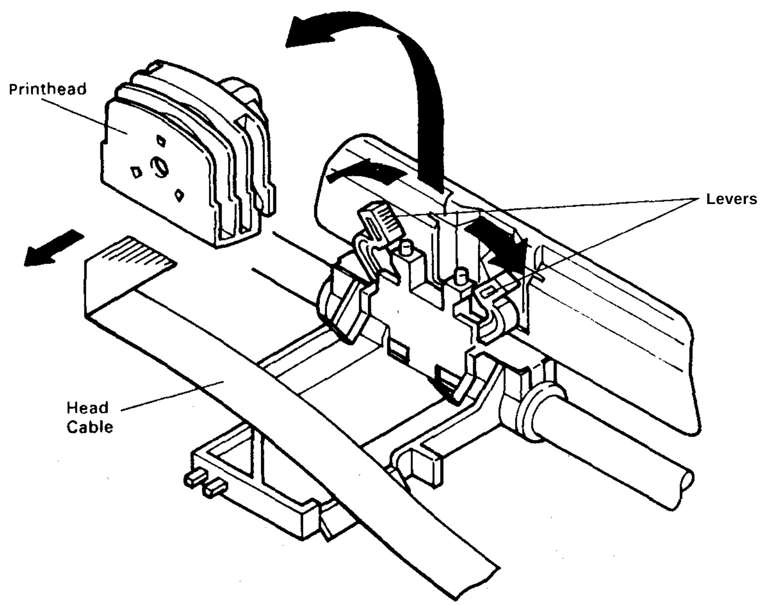


Figure 3-2. Printhead Removal

[Step 4] Disconnect the head cable from the connector on the printhead.

3.2.2 Removal of Casing

This section details the procedure for removing the upper casing and the control panel.

3.2.2.1 Upper Casing Removal

[Step 1] Remove the sheet guide unit, printer cover, paper tension unit, and paper feed knob.

[Step 2] Pull in the two notches securing the push tractor to the printer mechanism, and remove the push tractor from the printer mechanism.

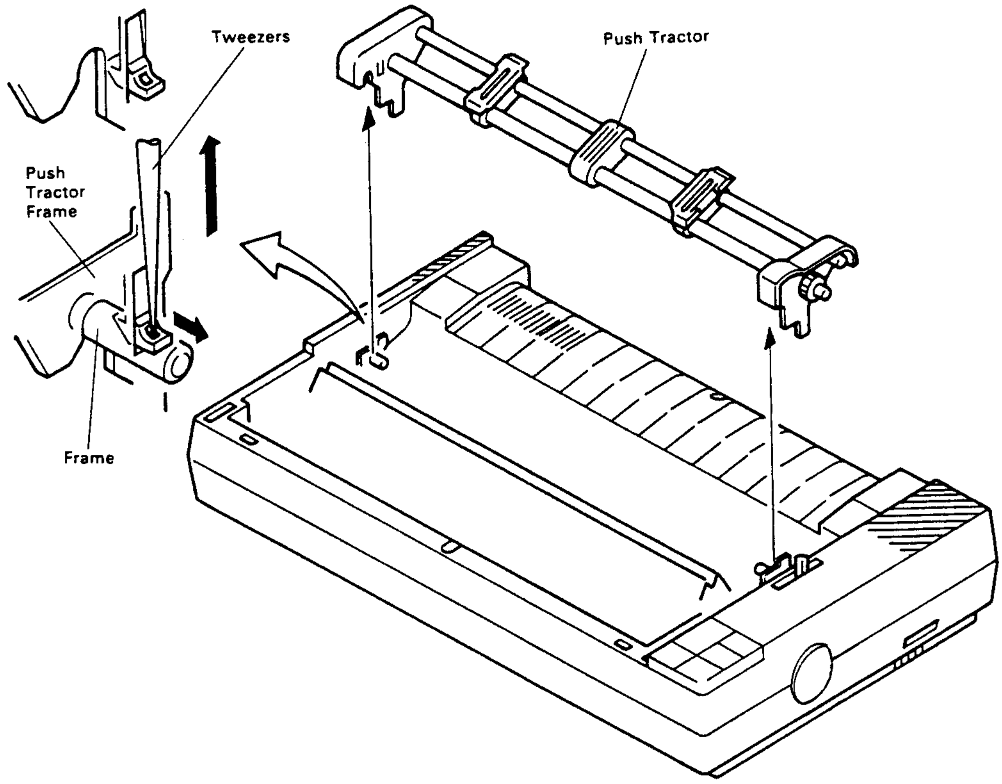


Figure 3-3. Push Tractor Removal

[Step 3] Remove the two C.B.B-tite (M4 x 25) screws securing the upper case.

[Step 4] Insert a standard screwdriver into each of the two holes at the front of the upper casing, and gently push (See figure 3-4) to unlock the notches.

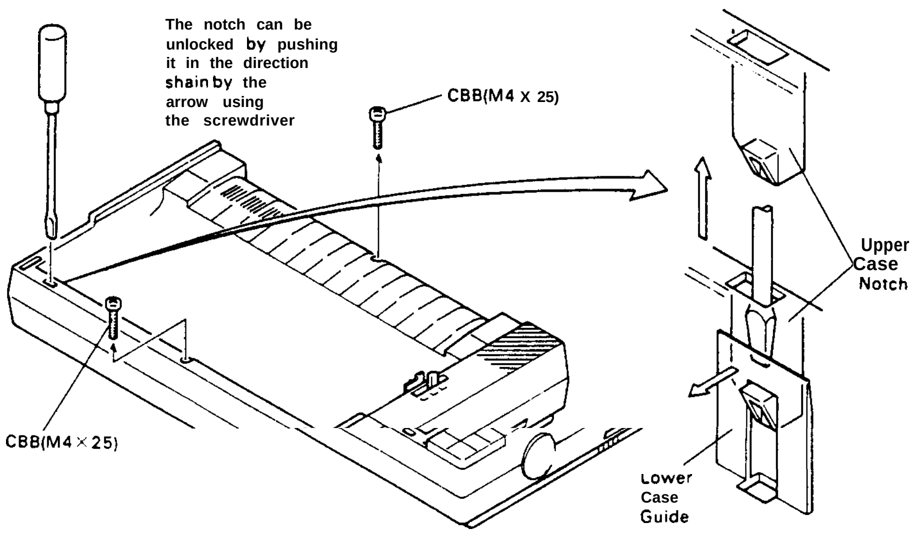


Figure 3-4. Upper Casing Removal -1

[Step 5] While lifting the upper casing, disconnect the cable of the control panel from connector CN3 on the TAMA board. Then remove the upper casing.

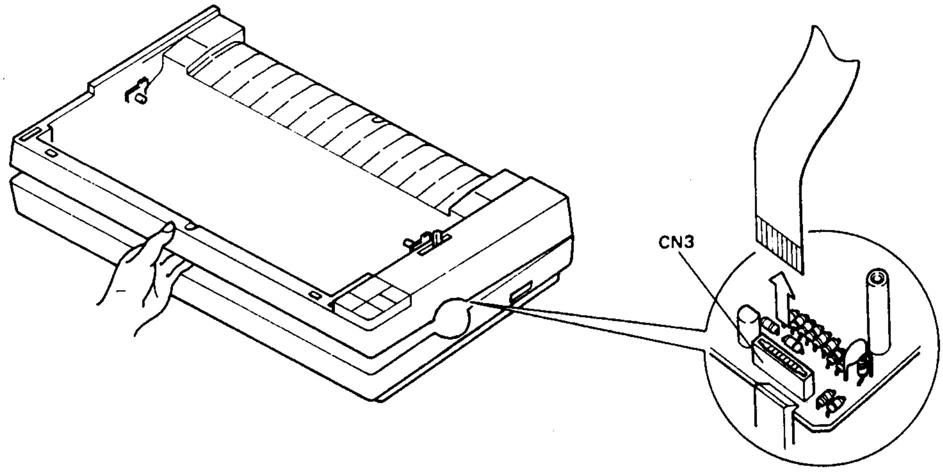


Figure 3-5. Upper Casing Removal -2

NOTE FOR REASSEMBLY:

Before reassembling the upper casing, prepare the FFC (Flat Flexible Cable) that connects the Control Panel and TAMA board in such a way that it can be connected to the Panel Cable Sailed Plate.

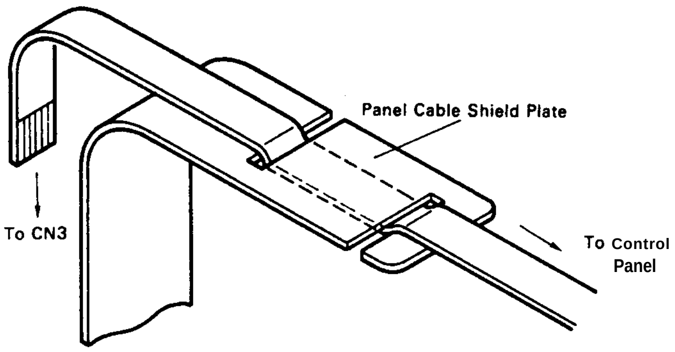


Figure 3-6. Control Panel FFC

3.2.2.2 Control Panel Removal

[Step 1] Remove the upper casing (as described in the previous section).

[Step 2] Turn the upper casing over, push in the two notches on the casing that are securing the control panel to it, and remove the control panel.

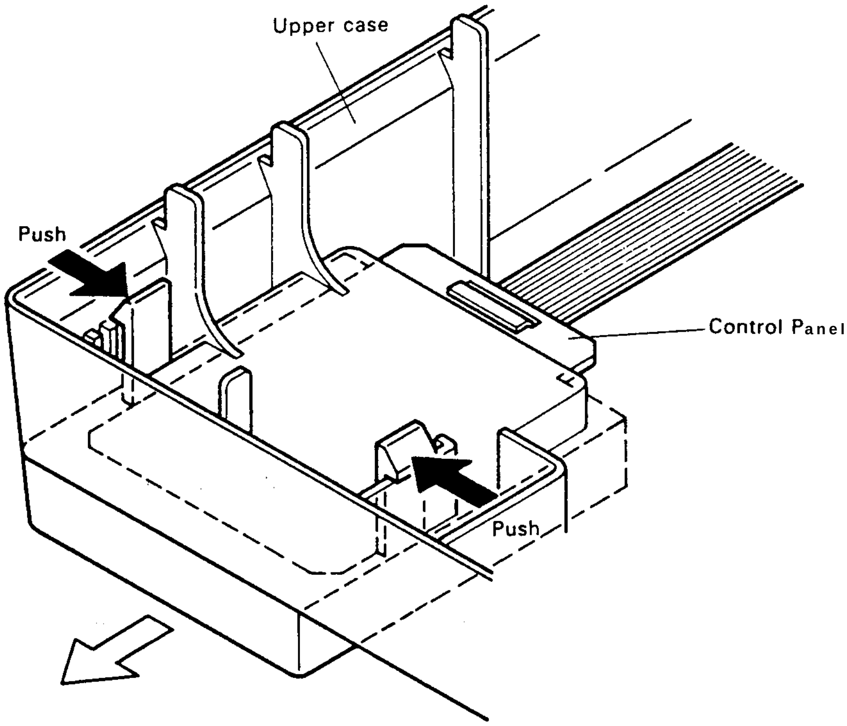


Figure 3-7. Control Panel Removal

3.2.3 Removal of Circuit Boards

This section describes the procedure for removing the TAMA Board and the TA-a filter unit.

3.2.3.1 TAMA Board Removal

[Step 1] Remove the upper casing (See section 3.2.2.1). The following connectors on the TAMA board, which are connecting it to external components, should be disconnected: CN4, CN5, CN6, CN7, CN8 FFC (Flexible Flat Cable), and CN9.

WARNING

Do not pull roughly on the connectors, or you may damage the board. Remove them by pulling gently while at the same time holding the board.

[Step 2] Remove the two C.B.B-tite (P2) (M3 x 6) screws, the C.B.S-tite (0) (M3 x 8) screw, and grand rink which are securing the TAMAboard to the base plate and the lower casing.

[Step 3] Loosen the four bent tabs on the lower casing which are securing it to the TAMA board. Then remove the TAMA board.

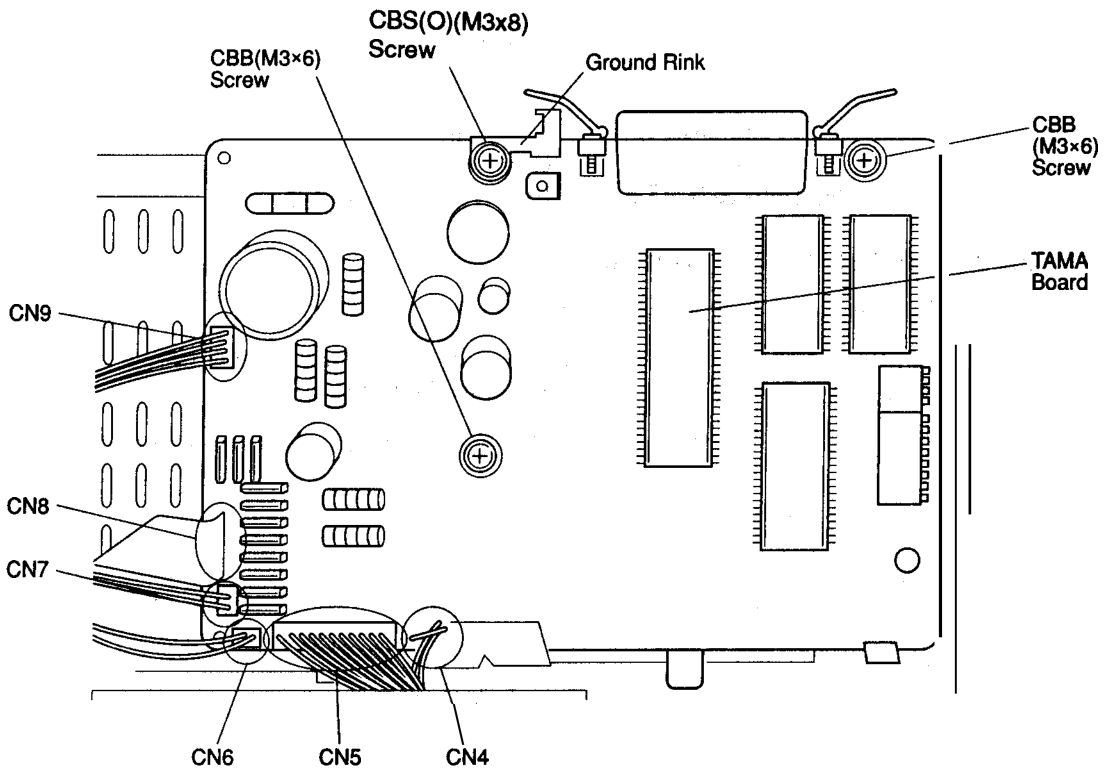


Figure 3-8. TAMA Board Removal

WARNING

Be careful not to bend the tabs toofar. Also, when pushing the tabs, be careful not to break them or to cause damage to components on the TAMA board.

ADJUSTMENT REQUIRED

When the TAMA board is replaced, perform the following adjustment.
*Section 4.2 **BI-DIRECTIONAL PRINTING ALIGNMENT ADJUSTMENT***

3.2.3.2 TA-a Filter Unit Removal

[Step 1] Remove the upper casing (See section 3.2.2.1).

[Step 2] Disconnect connector CN9 at the TAMA board. This connector connects the TA-a filter unit.

[Step 3] Remove the C. B.(O) (M4 x 8) screw securing the frame ground wire.

[Step 4] Remove the two C. B.B-tite (M4 x 12) screws and two C.B.(O) (M4 x 8) screws securing the filter unit, and then remove the unit.

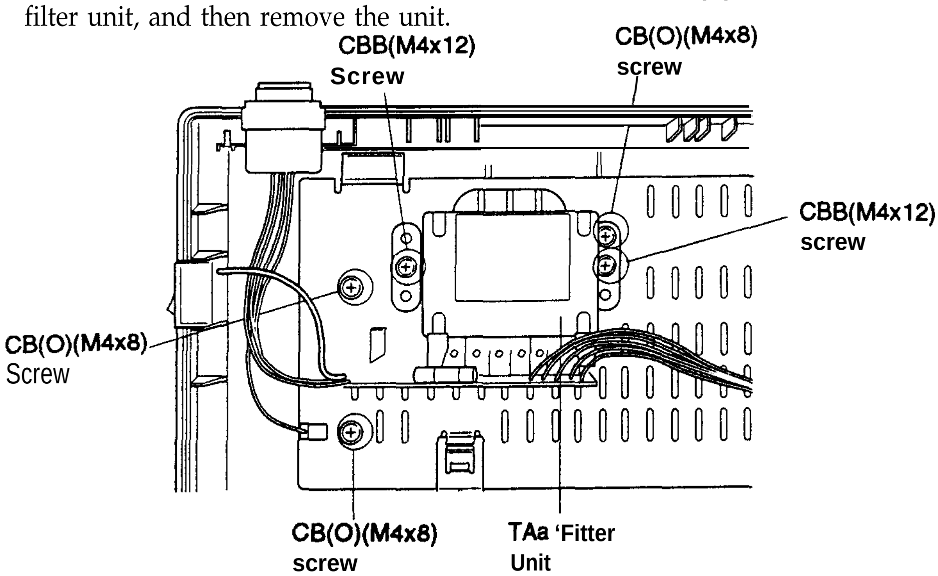


Figure 3-9. TA-a Filter Unit Removal

3.2.4 Removal of Printer Mechanism

This section describes the removal of printer mechanism.

[Step 1] Disconnect the cables from the following connectors on the TAMA board: CN4 (red), CN5 (white), CN6 (black), and CN8 FFC (Flexible Flat Cable).

[Step 2] Remove the fore C. B.B-tite (M4 x 12) screws securing the printer mechanism to the lower case.

[Step 3] Remove the printer mechanism.

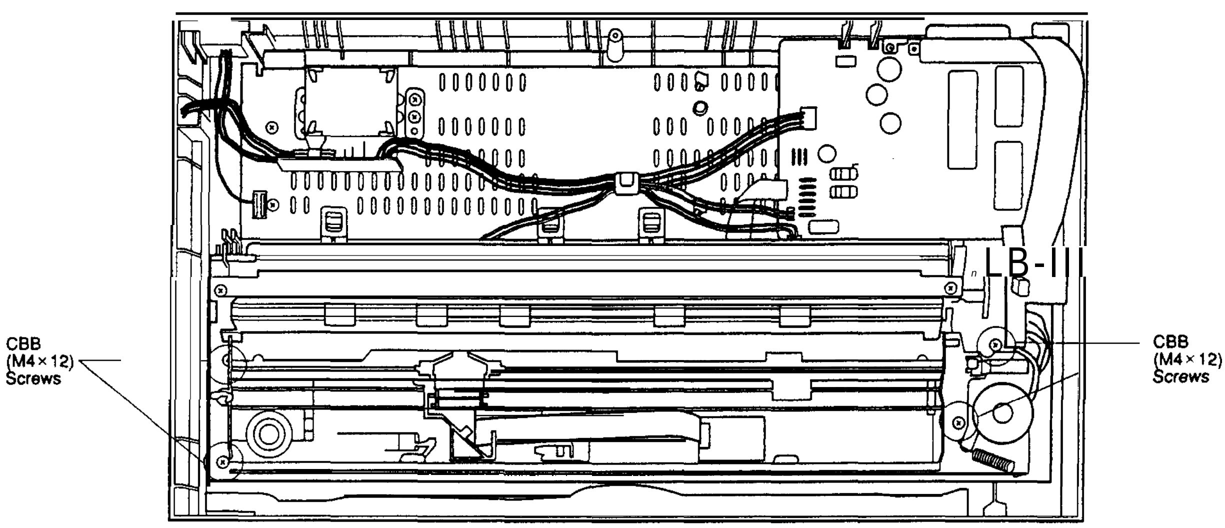


Figure 3-10. Printer Mechanism Removal

ADJUSTMENT REQUIRED

When the printer mechanism is replaced, perform the following adjustment.
Section 4.2 BI-DIRECTIONAL PRINTING ALIGNMENTADJUSTMENT

3.2.5 Disassembly of Printer Mechanism

This section details the removal of components from the printer mechanism.

3.2.5.1 Removal of Carriage Motor

[Step 1] Remove the printer mechanism (See section 3.2.4).

[Step 2] Disconnect the motor cable from the carriage motor.

[Step 3] Remove the belt tension spring E001 from the base frame.

[Step 4] Remove the timing belt from the belt pulley.

[Step 5] Remove the carriage motor mounting plate together with the carriage motor.

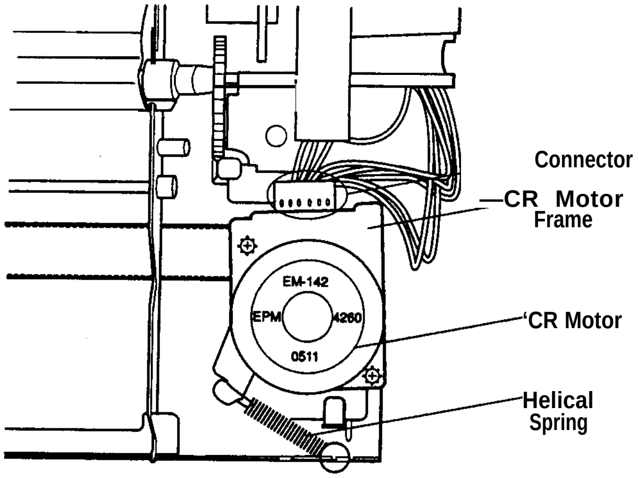


Figure 3-11. Carriage Motor Mounting Plate Removal

[Step 6] Remove the two C.B.S-tite (0) (M3 x 6) screws on the rear side of the carriage motor mounting plate, which secure the carriage motor.

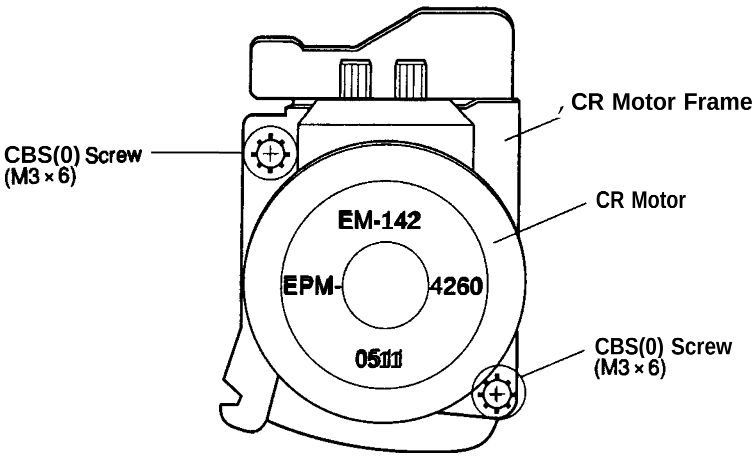


Figure 3-12. Carraige Motor Removal

ADJUSTMENT REQUIRED

When the carriage motor is removed, perform the following adjustment. *Section 4.1.1 Carriage Motor Backlash Adjustment* *4.2 BI-DIRECTIONAL PRINTER ALIGNMENT ADJUSTMENT*

3.2.5.2 Removal of Home-Position Sensor

[Step 1] Remove the printer mechanism. (See section 3.2. 4)

[Step 2] Turn the printer mechanism upside-down.

[Step 3] Push in the notch securing the home-position sensor, and remove the sensor from the base frame.

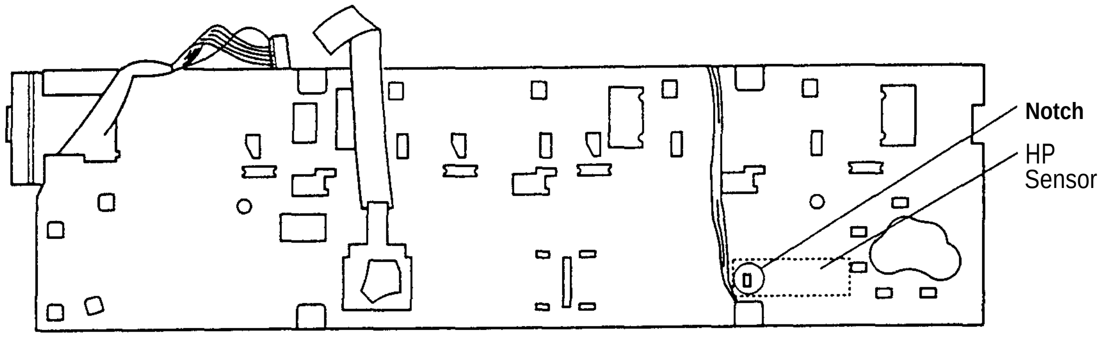


Figure 3-13. Home-Position Sensor Removal

3.2.5.3 Removal of Platen

[Step 1] Remove the printer mechanism. (See section 3.2.4)

[Step 2] Remove the paper tension unit.

[Step 3] Remove the C-ring (6) from the plate shaft.

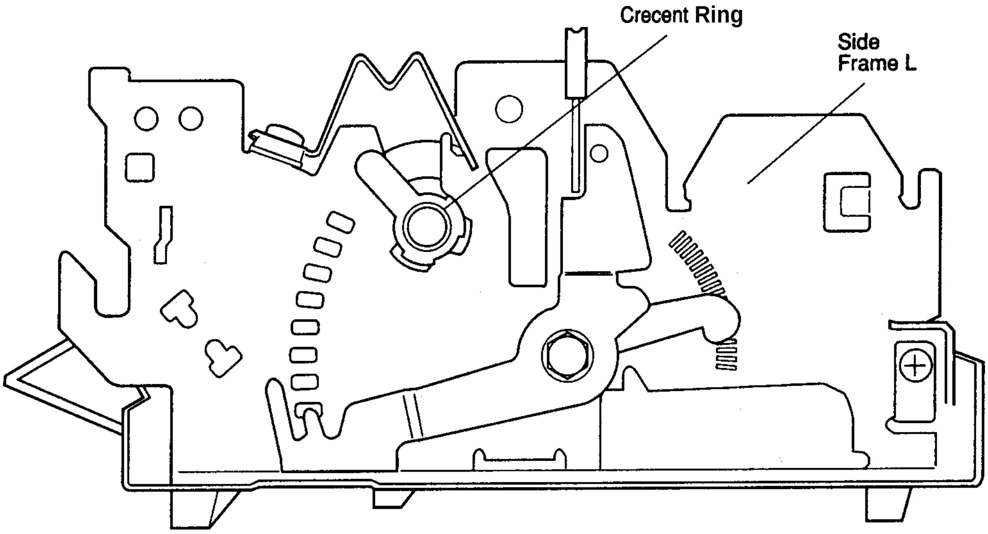


Figure 3-14. Cresent Ring Removal

[Step 4] Remove the two C.B.N.S-tite (M3 x 6) screws securing the platen cover and remove the platen cover.

[Step 5] Remove theshaftholderfrom therightsideofthe side frame.

[Step 6] Remove the platen bymovingit totheright side.

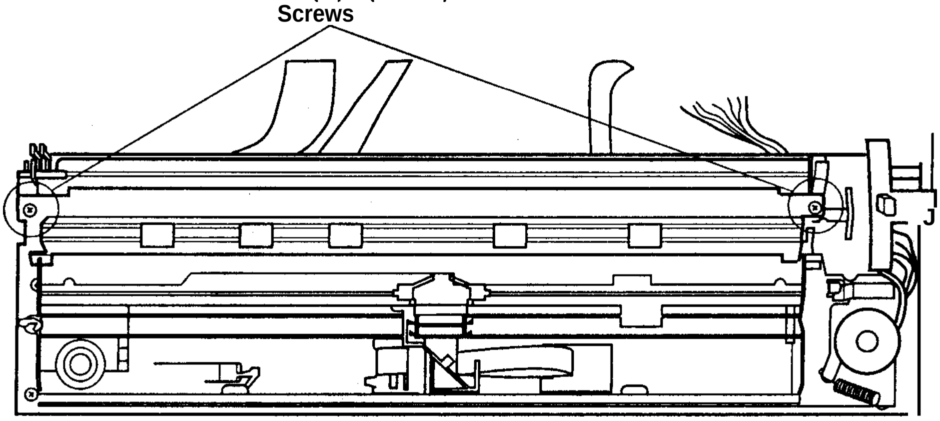


Figure 3-15. Platen Cover Removal

ADJUSTMENT REQUIRED

When the platen is replaced, perform the following adjustment.
Section 4.1.3 Platen Gap Adjustment

3.2.5.4 Separate of Frame

[Step 1] Remove the platen. (See section 3.2.5.3)

[Step 2] Remove the printhead. (See section 3.2.1)

[Step 3] Remove the FFC, head cable holder (L), and head cable holder (R) from base frame.

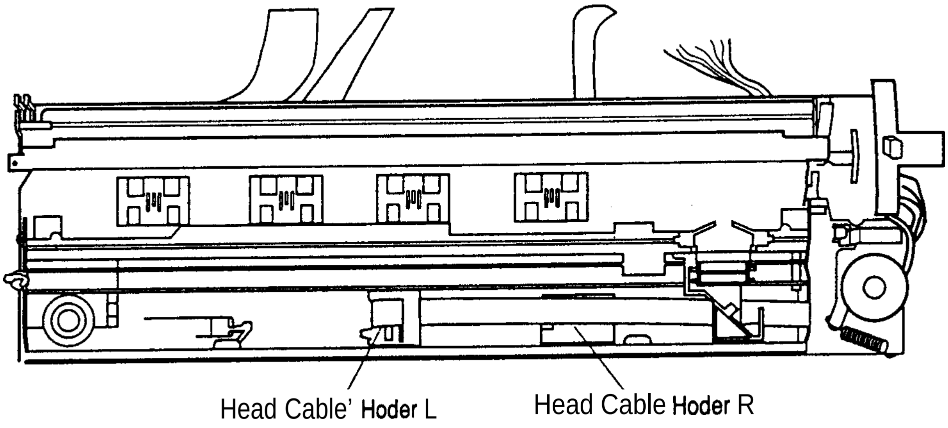


Figure 3-16. Head Cable Holder and FFC Removal

[Step 4] Disconnect the motor cable from the carnage motor and thepaperfeed motor.

[Step 5] Change position of tension spring hook from normal position totemporary position.

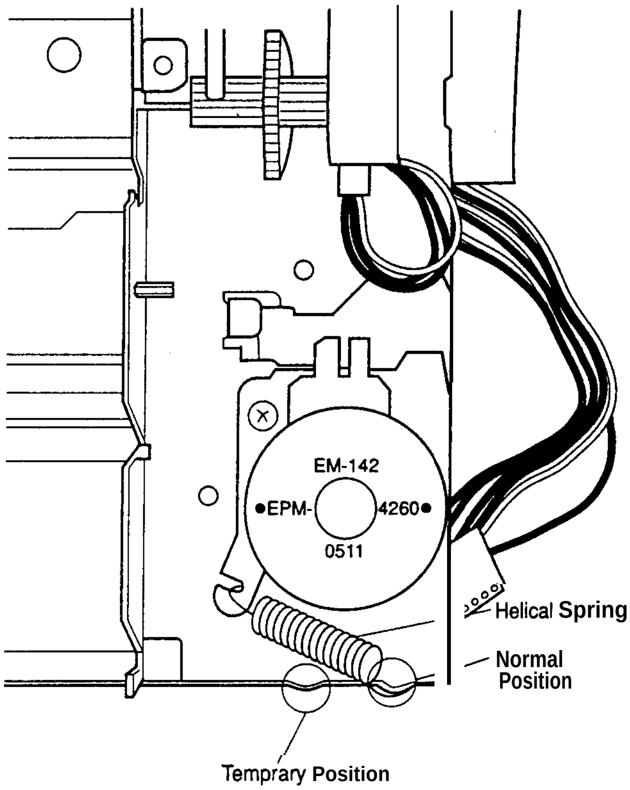


Figure 3-17. Helical Spring Hook

[Step 6] Push the two notches of the release lever outward. Remove the release lever.

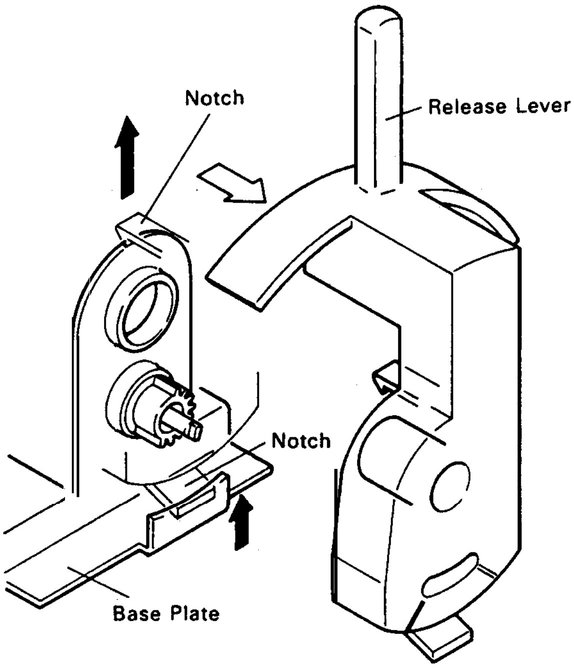


Figure 3-18. Release Lever Removal

ASSEMBLY POINT

When the release lever is replaced, the markings should be analogously positioned.

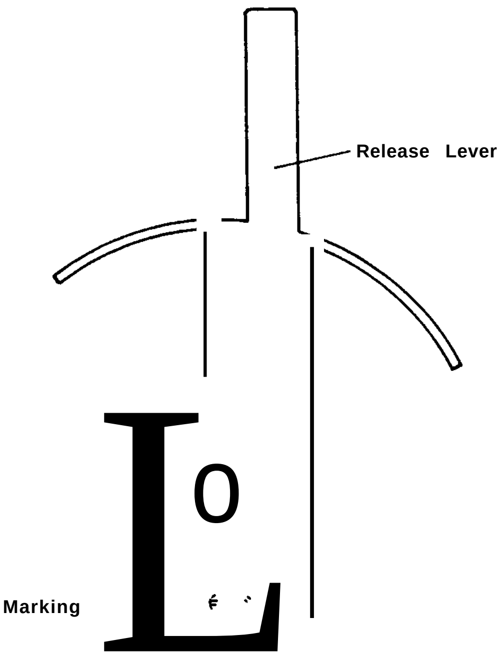


Figure 3-19. Release Lever Replacement

[Step 7] Separate the tractor cancellation cum from paper feed lever cancellation shaft.

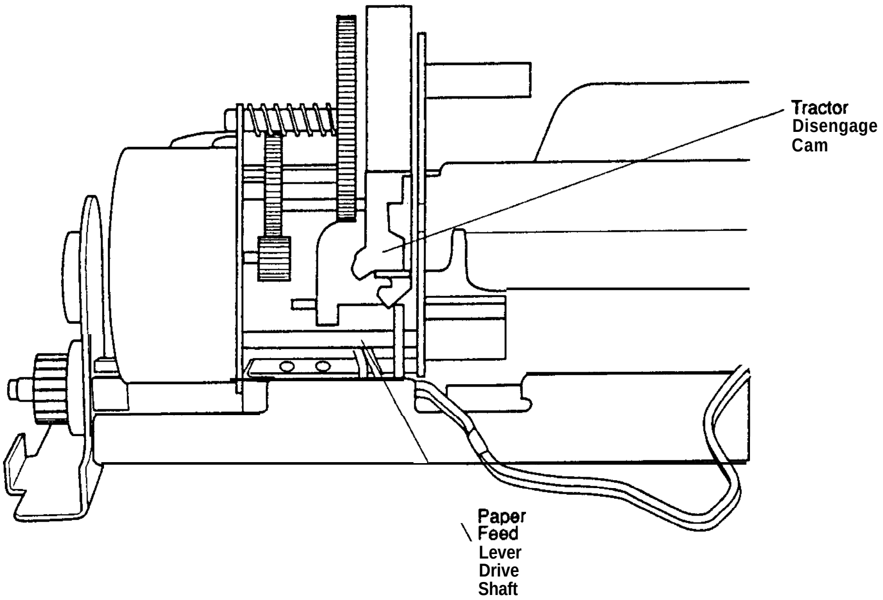


Figure 3-20. Separation of Tractor Diseugage Cam

[Step 8] Turn the printer mechanism upside-down, and manually move the carriage unit until it is at the cut-out section of the base frame. The joint of the carriage unit and timing belt should be visible through the cut-out.

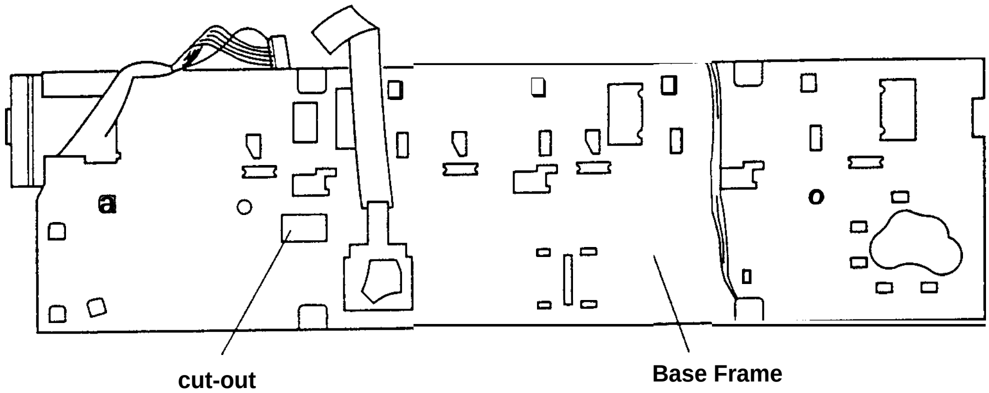


Figure 3-21. Bottom View of Printer Mechanism

[Step9] Remove the two C.B.S-tite. (0) (M3 x 6) screws which are securing the side frames to the base frame, and remove the side frames. Separate side frames from base frame.

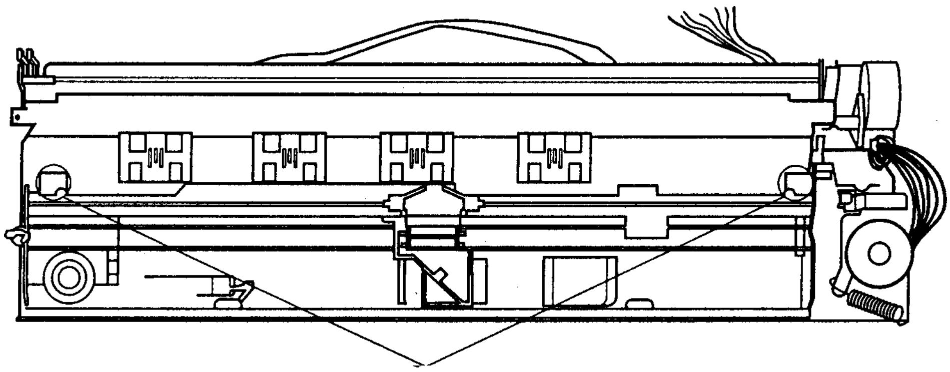


Figure 3-22. Separate of Frame

ADJUSTMENT REQUIRED

> *When the printer mechanism is separated, perform the following adjustment.*
> *Section 4.1.3 Platen Gap Adjustment*

3.2.5.5 Removal of Paper Feed Motor

[Step 1] Separate side frames from base frame. (See section 3.2.5 .4)

[Step 2] Remove the two C.B.S-tite.(O) (M3 x6) screws securing the paper feed motor.

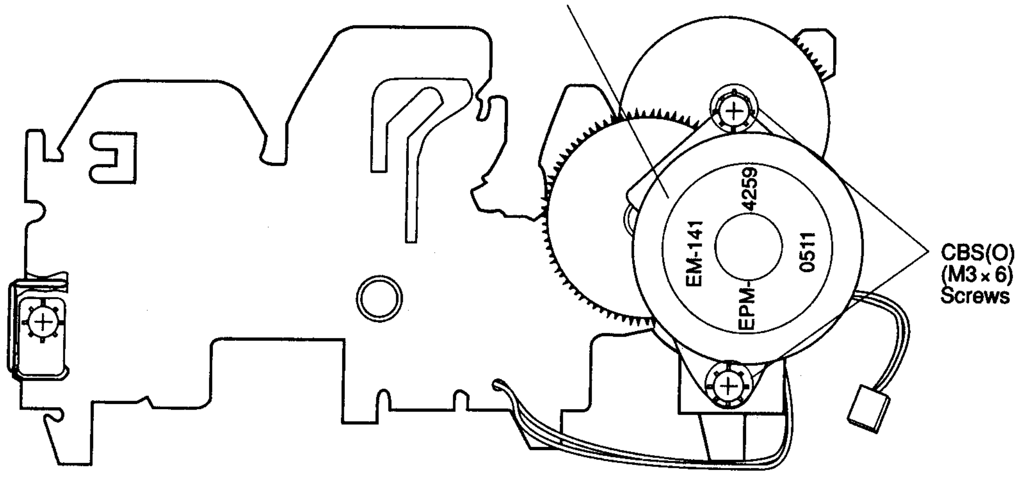


Figure 3-23. Paper Feed Motor Removal

ADJUSTMENT REQUIRED

> *When the paper feed motor is removed, **perform** the following adjustment.*
> *Section 4.1.2 Paper Feed Motor Backlash Adjustment*

3.2.5.6 Removal of Paper End Sensor

[Step 1] Separate side frames from base frame. (See section 3.2.5.4)

[Step 2] Loosen the two bends securing the paper end sensor to the paper guide at the back of the printer.

[Step 3] Remove the paper end sensor.

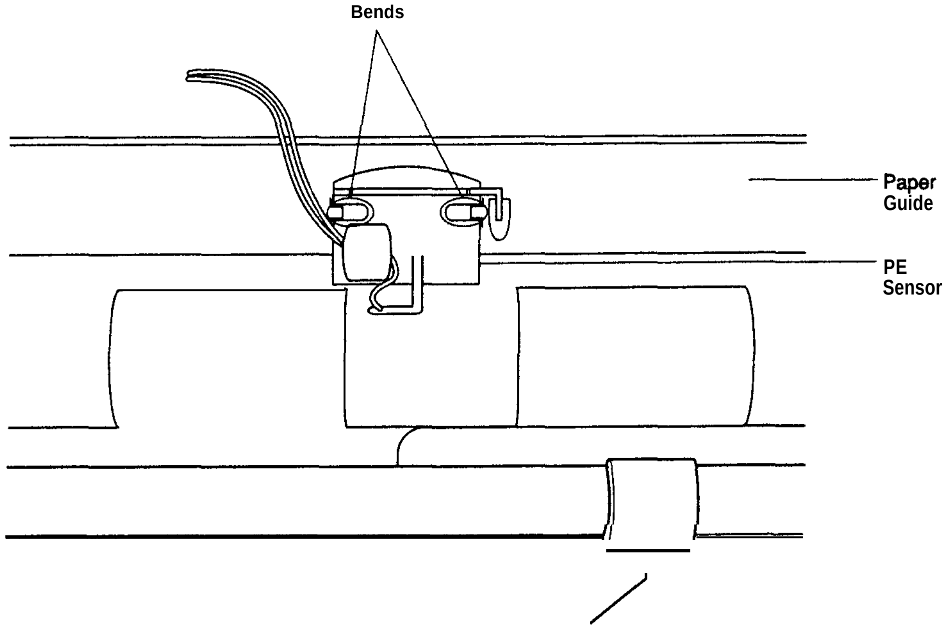


Figure 3-24. Paper End Sensor Removal

3.2.5.7 Removal of Paper Guide Plate

[Step 1] Separate side frames from base frame. (See section 3.2.5.4)

[Step 2] Remove the paper guide plate spring from the base frame.

[Step 3] Remove the paper guide plate.

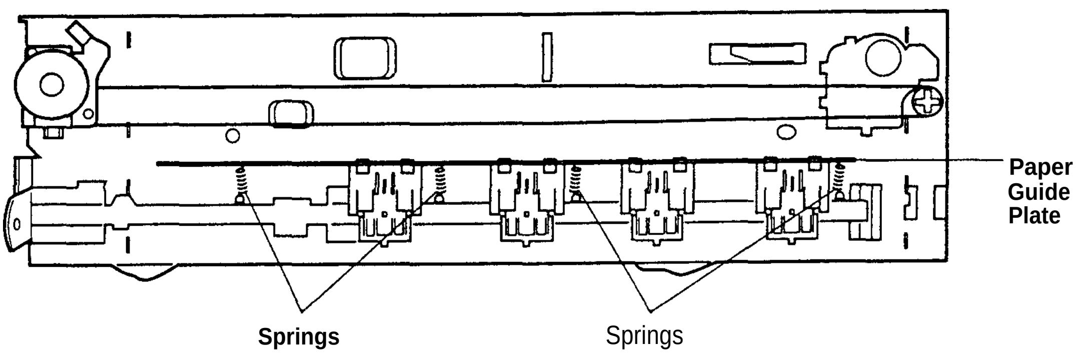


Figure 3-25. Paper Guide Plate Removal

3.2.5.8 Removal of Carriage

[Step 1] Separate side frames from base frame. (Seesection3.2.5 .4)

[Step 2] Remove the HNO (M4) nut Securing the adjust lever, and remove the adjust lever.

[Step 3] Remove the head adjust lever from thecarriage guide shaft.

[Step 4] Remove thecarnageguide shaft and the carriage from the frame.

[Step 5] Remove the carnage from the carriage guide shaft.

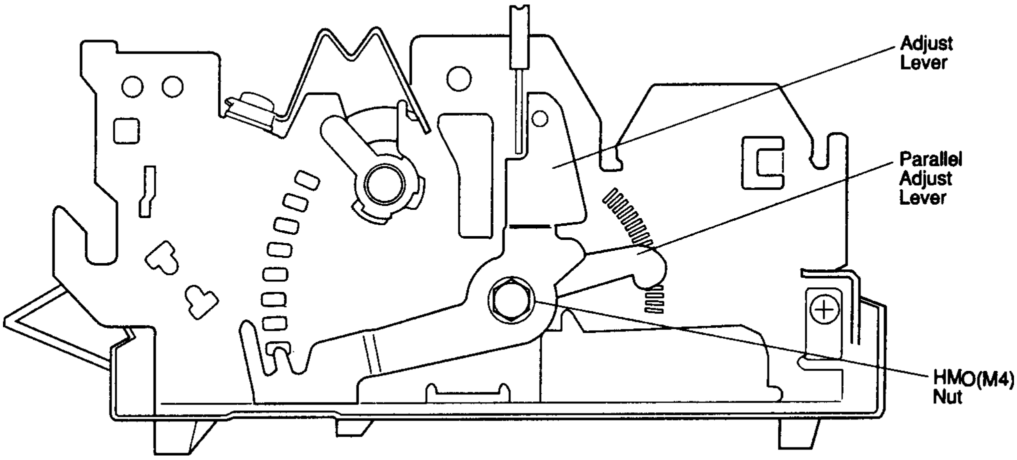


Figure 3-26. Adjust Lever Removal

ADJUSTMENT REQUIRED

When the paper feed motor is removed, perform the following adjustment.
Section 4.1.3 Platen Gap Adjustment

3.2.5.9 Disassembly of Tractor Unit

[Step 1] Pull and remove the tractor shaft and the sprocket guide from the tractor frame.

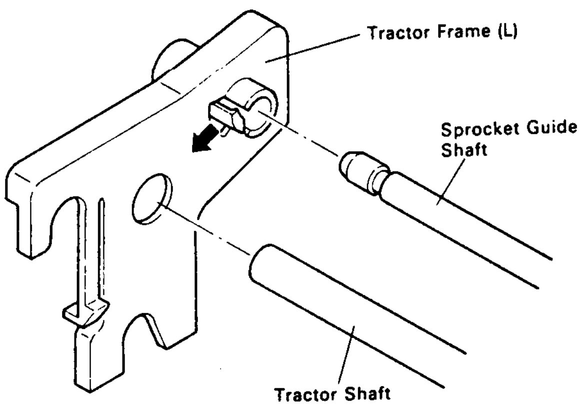


Figure 3-27. Tractor Frame L Removal

[Step 2] Remove the tractor set L, the paper support, and tractor set R from the tractor and sprocket guide shafts.

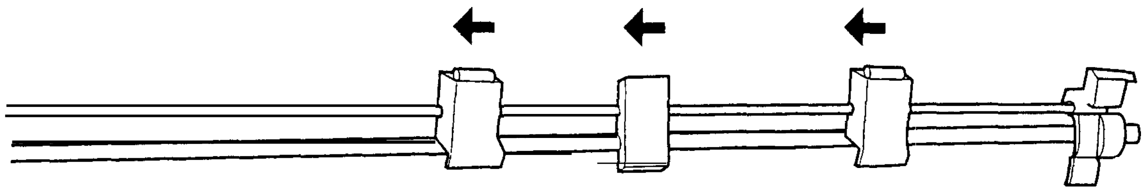


Figure 3-28. Extraction of Tractor Set

NOTES FOR REASSEMBLY:

When reassembling, align the phases as shown below.

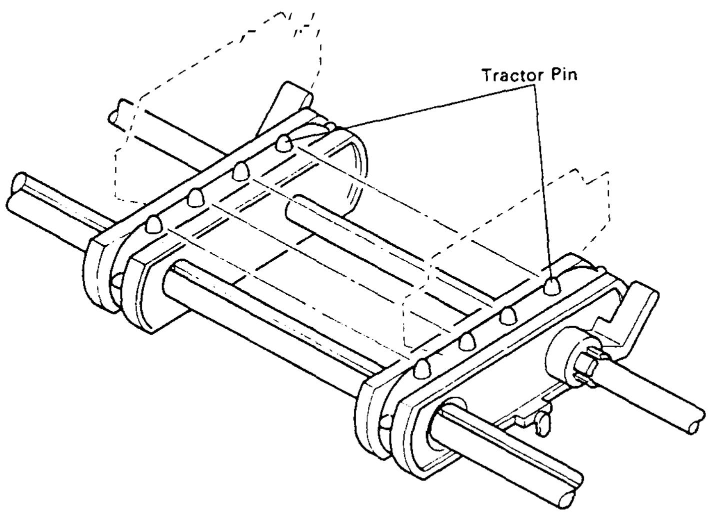


Figure 3-29. Tractor Phase Alignment

Chapter 4 Adjustments

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4.1 ADJUSTMENTS

This section describes the adjustment procedures necessary when the LX-1050+ printer is reassembled or when parts are reinstalled or replaced. These procedures are necessary to ensure the correct operation of the printer.

4.1.1 Carriage Motor Backlash Adjustment

This adjustment is required either when the carriage motor is replaced or when its mounting position is shifted.

1. Remove the carriage motor frame and carnage motor from base frame. (See section 3.2.5.1)
2. Loose the two CBS(0) (M3 x 6) screws on the carriage motor.
3. Manually rotate the carnage motor, and adjust the backlash between the pinion and the belt pulley.
   Allowable backlash: 0.05-0.15 mm
4. Tighten the screws on the carriage motor.

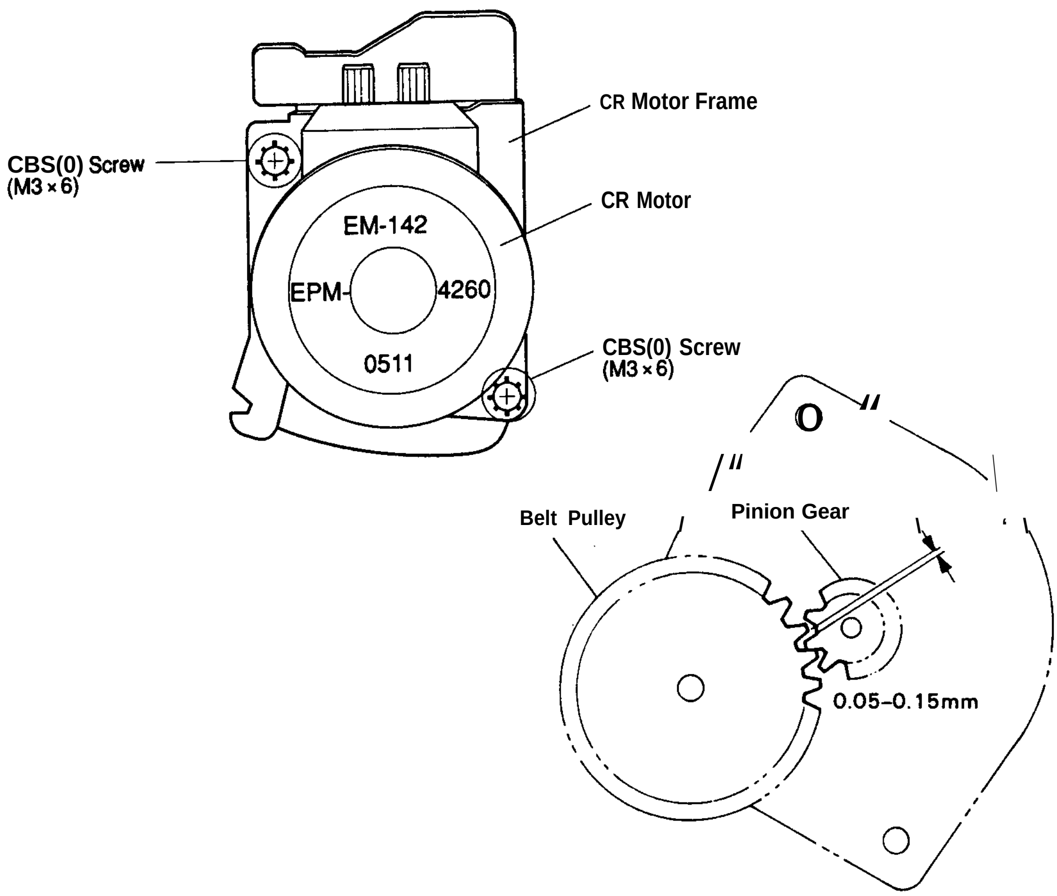


Figure 4-1. Carraige Motor Backlash Adjustment

4.1.2 Paper Feed Motor Backlash Adjustment

This adjustment is required either when the paper feed motor is replaced or when its mounting position is shifted.

1. Separate side frames from base frame. (See section 3.2.5.4)
2. Loose the two CBS(O)(M3 x 6) screws on the paper feed motor.
3. Manually rotate the paper feed motor, and adjust the backlash between the pinion and the appear feed reduction gear.
   Allowable backlash: 0.05-0.20 mm
4. Tighten the screws on the paper feed motor.

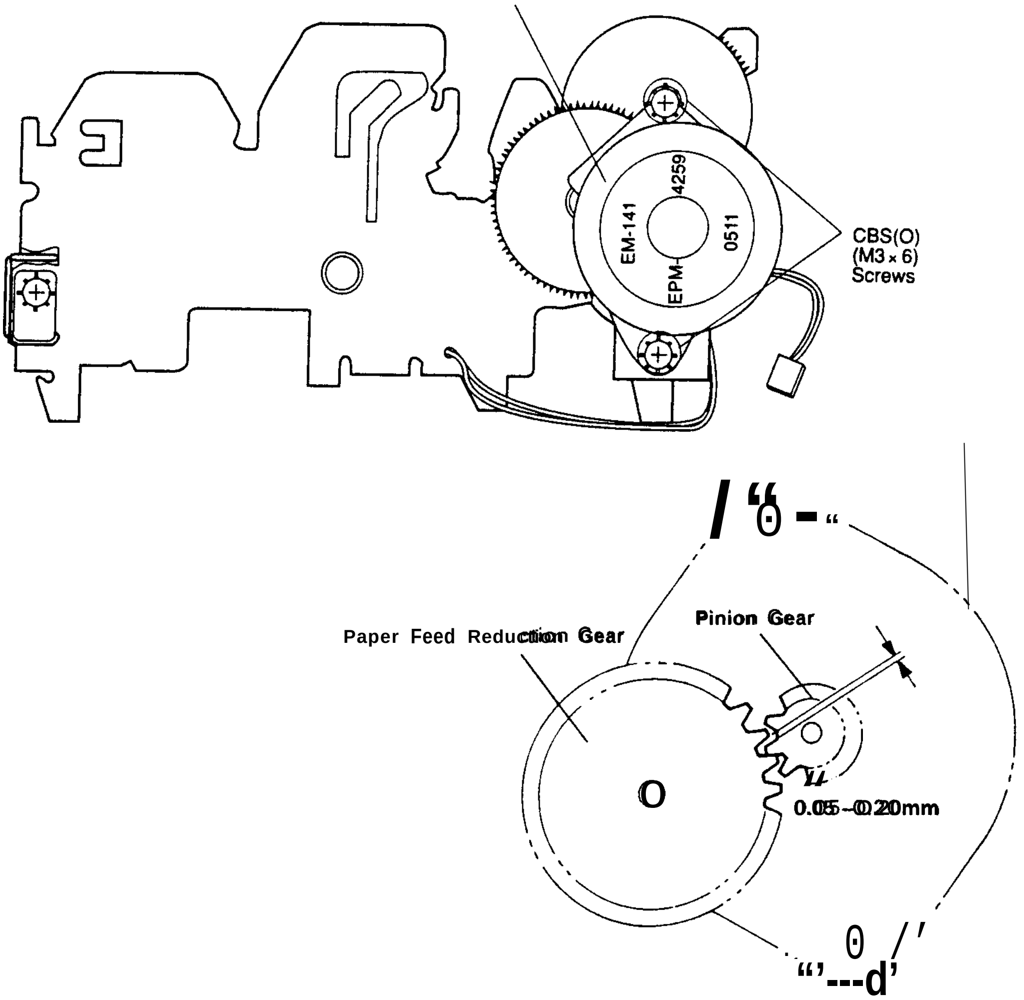


Figure 4-2. Paper Feed Motor Backlash Adjustment

4.1.3 Platen Gap Adjustment

Following the removal of the carriage guide shaft or adjust lever, or if printing is abnormal, the gap between the platen and the print head should be adjusted.

1. Remove the printer mechanism (See section 3.2.4),
2. Remove the printhead. Using tweezers, remove the ribbon mask. Remove the maskby pulling it slightly forward, then lifting.

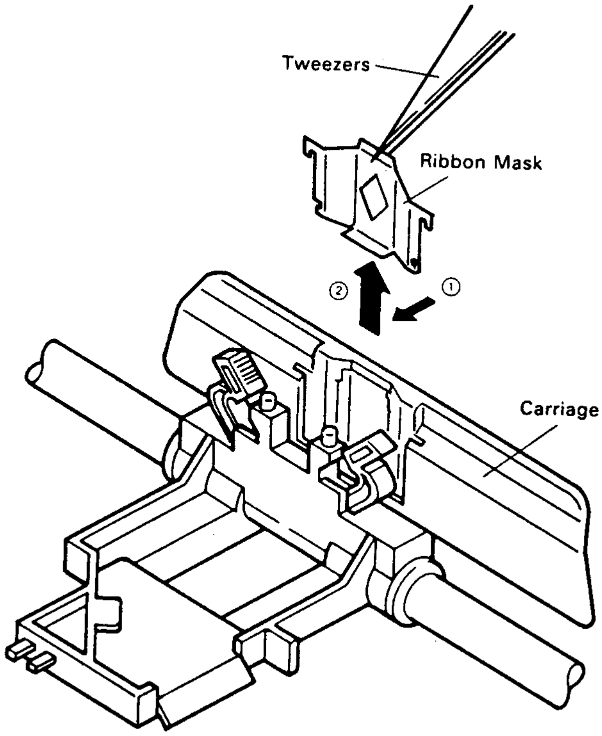


Figure 4-3. Removal of Ribbon Mask

3. Reinstall the printhead.
4. Set the release lever to the friction position.
5. Set the parallel adjust lever to the center position.
6. Manually move he carriage to column 126.
7. Lightly loosen the HMO(M4) nut securing the head adjust lever.

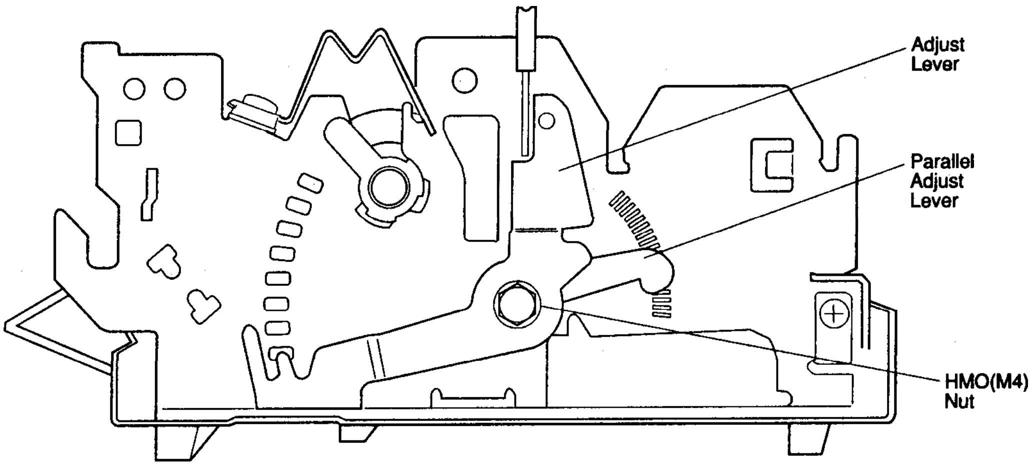


Figure 4-4. Head Adjust Lever B

8. insert the blade of a screwdriver into the countersink of carnage guide shaft.

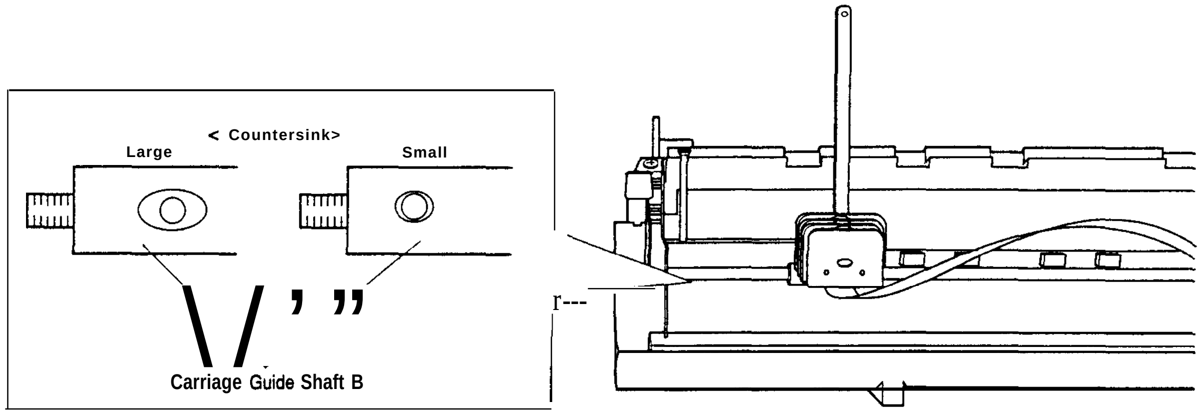


Figure 4-5. Platen Gap Adjustment

9. Adjust the platen gap using a thickness gauge, while rotating carnage guide shaft in the direction of the arrow in figure.

   Gap value: 0.44 mm gauge is inserted.
   0.47 mm gauge is not inserted.

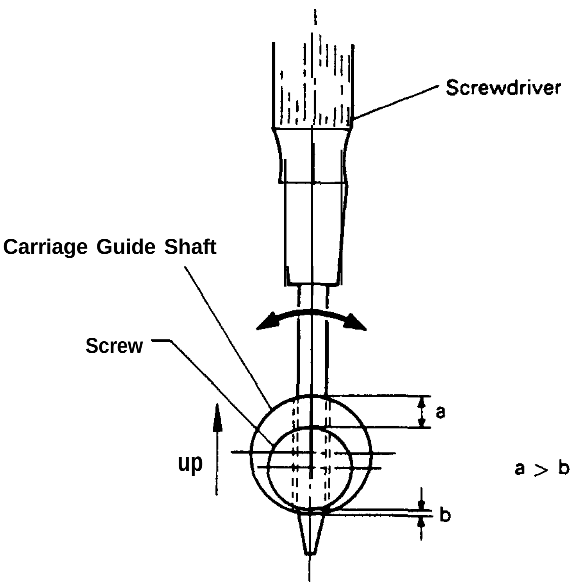


Figure 4-6. Eccentric of Guide Shaft

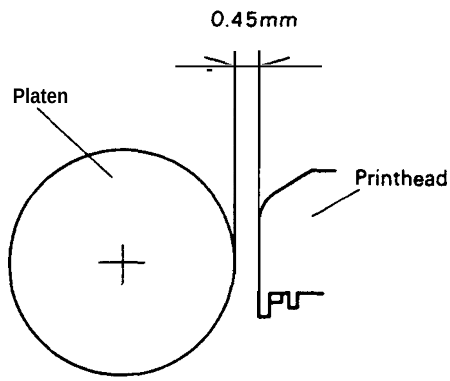


Figure 4-7. Platen Gap

10. Set the head adjust lever at the 2nd position in step 9, and tighten the HNO(M4) nut.
11. Manually move the carriage to column 10.
12. Using the thickness gauge, parallel adjust lever so that the platen gap matches the specified value.
13. Move the carriage to the 126 column, and measure the gap value again to confirm that the gap value is correct.
14. Remove the printhead from the carriage and set the ribbon mask, then reinstall the printhead on the carriage.

4.2 61-DIRECTIONAL PRINTING ALIGNMENT ADJUSTMENT

The bi-directional printing alignment adjustment is required when the printer mechanism or the main board is replaced. By performing this adjustment, a compensation value is determined for the mechanical control as to compensate the deviation of print position, which may be caused by the different print speeds due to the tolerance of the mechanical components, and the deviation of print timing between odd-numbered lines and even-numbered lines in bi-directional printing. The printer stores the compensation data in the EEPROM on the main board (TAMA), and referring to this data when the bi-directional printing is performed.

1. Set continuous paper to the tractor unit of the printer.
2. Connect the PC to the printer and turn the both units on.
3. Execute BASIC on the PC and start the adjustment program "SHASTAWP.BAS".
4. Follow the instruction displayed on the monitor, and press ENTER key to start the adjustment.
5. The printer pMts the draft mode check pattern with a sample compensation value.
6. Check the printed draft mode sample pattern, and if the character" 1" is not vertically aligned in both mid-numbered lines and even-numbered line, enter the compensation value in the range from -16 to +16, from the keyboard.
   - Positive compensation value: Shift 2nd line to LEFT
   - Negative compensation value: Shift 2nd line to RIGHT
7. The printer print the daft mode sample pattern with the selected compensation value for confirmation. If the alignment is good, press "Y" to NLQ mode adjustment.
8. The printer printing NLQ mode sample pattern. The procedure of NLQ mode adjustment is same as procedure of draft mode.
9. If the alignment is good, press "Y" to finish the adjustment.
10. Turn the printer off.

Because the compensation value specified within this program is not valid until the printer is turned off, turn the printer off immediately after you have finish the adjustment.

Chapter 5 Troubleshooting

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List of Tables

5.1 OVERVIEW

Troubleshooting most other serial impact dot matrix printers is difficult to perform, since there may be wide variety of problems. Therefore, the LX-1050+ have a sophisticated, built-in self-diagnostic function that reduces troubleshooting time by identifying failed parts or components.

The following tables and figure provide troubleshooting information.

Table 5-1. Motor Resistance

Motor	Resistance	Remark
CR Motor	11.0 Ω ± 10 Ω / Phase	At25"C
PF Motor	40.0 Ω ± 7% / Phase	At25'C

Table 5-2. Sensor Status

Sensor	Point	Signal Level	Status
PE Sensor	CN6 / Pin 1	H (5V)	Paper exist
		L (GND)	No paper (Paper end)
HP Sensor	CN7 / Pin 1	H (5V)	Out of home position
		L (GND)	At home position
Release Sensor	CN4 / Pin 1	H (5V)	Friction feed
		L (GND)	Release/Tractor feed

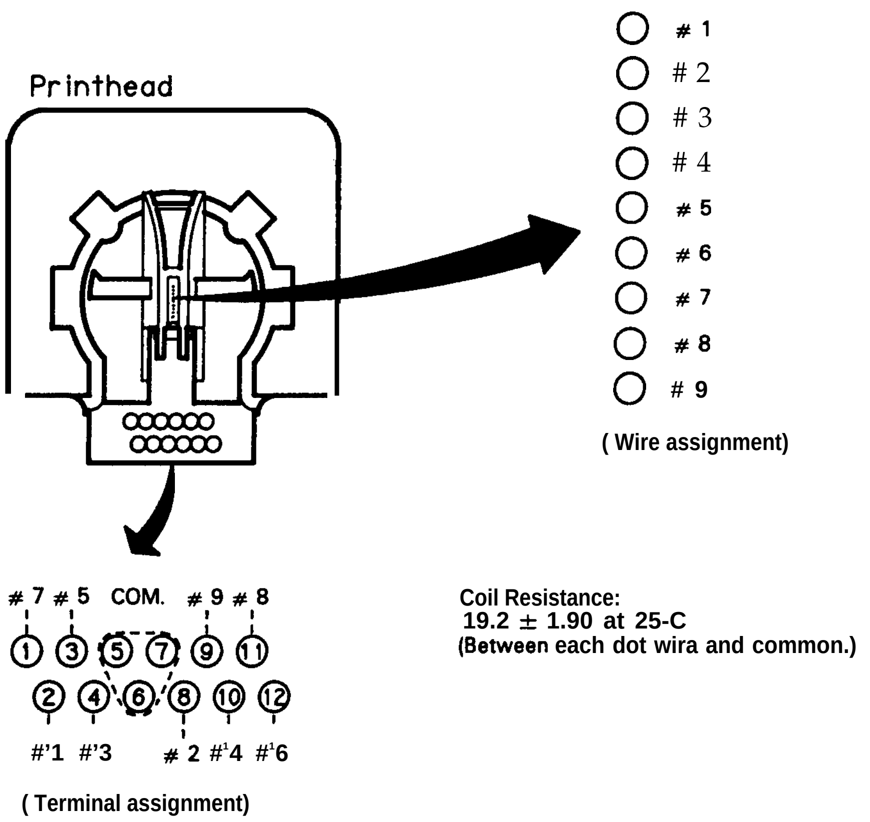


Figure 5-1. Printhead Resistance

5.2 SELF-DIAGNOSTIC FUNCTION

This section describes the self-diagnostic function, in which the controller automatically checks the operating conditions of each component. If any abnormality is detected, the printer displays an error message by beep sound. Table 5-3 lists the messages that tell you if service maintenance is required.

Table 5-3. Error Codes

Error	Buzzer
Carriage trouble	Beeps 6 times, pausing after 3rd beep
Paper out	Beeps 20 times, pausing briefly after 4 beeps
Abnormal voltage	Beeps 8 times, pausing after every beep
Incorrect SRAM	Beeps 8 times, pausing briefly after 2 beeps
Incorrect RAM inside CPU	Beeps indefinitely until power OFF

5.3 TROUBLESHOOTING

This section describes the troubleshooting of abnormal operations and circuit board unit repair.

5.3.1 Troubleshooting of Abnormal Operation

This section describes how to detect malfunctions, how to determine the cause, and what actions to take for various types of malfunctions. Each paragraph refers you to a detailed troubleshooting table.

Table 5-4. Symptoms and Problems

Symptom	Printer Condition	Reference Table
The printer does not operate at all.	Printer mechanism does not start initialize, when power on.	5-5
The LEDs on control panel does not operate at all.	The printer mechanism start initialized, but LEDs does not operate.	5-6
The buttons on control panel does not operate	The printer does not change state, when push the button.	5-7
Carriage error displayed	The printer display carriage error, when power on.	5-8
Paper is not fed	The paper is not fed from tractor.	5-9
	The paper is not fed from manual feed slot.	5-1o
Paper out displayed	The paper is fed, but paper out displayed	5-11
Abnormal voltage displayed	The printer display abnormal voltage.	5-12
Incorrect SRAM displayed	The printer displayed incorrect SRAM.	5-13
Incorrect RAM inside CPU displayed	The printer display incorrect RAM inside CPU.	5-14
Self test abnormal	The carriage is moved, but the printhead does not print.	5-15
Self test printout has poor quality	Dot missing	5-16
	Line spacing is bad	5-17
Abnormal print in on line mode	Bi-directional printing position is abnormal	5-18
	The printer does not print.	5-19
	Data from the host is incorrectly	5-20

Table 5-5. The Printer does Not Operate at *All*

Cause	Step	Checkpoint	Finding	Solution
Connector CN9 on the TAMA board may be disconnected.	1	Is connector CN9 on the TAMA board disconnected?	Yes	Connect CN9 on TAMA board
The fuse F1 on the TA-a filter unit is blown.	2	Is the fuse F1 on the TA-a filter unit blown?	Yes	Replace the fuse F1 .
The TA-a filter unit maybe dead.	3	With the power on, are there output of 26 VAC between two red wires and 12 VAC between two blue wire for CN1 on the TA-a filter unit.	No	Replace the TA-a filter unit.
The TAMA board maybe bead.	4		—	Replace the TAMA board

Table 5-6. The LEDs do Not Operate at All

Cause	Step	Checkpoint	Finding	Solution
Connector CN3 on the TAMA board may be disconnected.	,	Is connector CN3 on the TAMA board disconnected?	Yes	Connect CN3 on the TAMA board.
Control panel may be dead.	2	—	—	Replace the control panel.
The TAMA board maybe dead.	3	—	—	Replace the TAMA board.

Table 5-7. The Buttons do Not Operate at All

Cause	Step	Checkpoint	Finding	Solution
Connector CN3 on the TAMA board may be disconnected.	,	Is connector CN3 on the TAMA board disconnected?	Yes	Connect CN3 on the TAMA board.
Control panel may be dead.	2	—	—	Replace the control panel.
The TAMA board maybe dead.	3	—	—	Replace the TAMA board.

Table 5-8. Carriage Error Displayed

Cause	Step	Checkpoint	Finding	Solution
The carriage mechanism is bad.	1	Turn the printer off and try to move the carriage manually. Does the carriage move smoothly?	No	Check the carriage mechanism, and replace or reassembly the bad parts.
The HP sensor is dead.	2	Does the carriage move and clash to right or left frame before error displayed?	Yes	Replace the HP sensor.
The carriage motor is dead.	3	Disconnect CN5 on the TAMA board and check the coil resistance between: pin 6 and pin 4; pin 2 and pin 4; pin 5 and pin 3; pin 1 and pin 3 (4 points total) on the disconnected cable side using a multimeter. Pin 6- Pin 4 Pin 2- Pin 4 Pin 5- Pin 3 Pin 1- Pin 3 Are the resistances of all four points approximately 11 ohms?	No	Replace the carrfage motor.
		If any coil is shorted, check the carriage motor drive circuit using the following procedure: 1. Set the multimeter to resistance check mode. 2. Place the (-) terminal of the multimeter on pins 1, 2, 5, 6 of connector CN5 on the TAMA board. 3. Place the (+) terminal on pin 2 of connector CN7 on the TAMA board. (GND) With power off, does the multimeter detect "00" ?	No	Replace the carriage motor with TAMA board.
The TAMA boards may be dead.	4			Replace the TAMA board.

Table 5-9. Paper is Not Fed (1)

Cause	Step	Checkpoint	Finding	Solution
The paper end sensor may be dead.	1	Does the sensor toggle? (Check with multimeter)	No	Replace the paper end sensor.
The release sensor may be dead.	2	Does the sensor toggle? (Check with multimeter)	No	Replace the release sensor.
The paper feed motor may be dead.	3	Disconnect CN5 on the TAMA board and cheek the coil resistance between: pin 12 and pin 10; pin 8 and pin 10; pin 11 and pin 9; pin 7 and pin 9 (4 points total) on the disconnected cable side using a multimeter. Pin 12- Pin 10 Pin 8- Pin 10 Pin 11- Pin 9 Pin 7- Pin 9 Are the resistances of all four points approximately 40 ohms?	No	Replace the paper feed motor.
		If any coil is shorted, check the paper feed motor drive circuit using the following procedure: 1. Set the multimeter to resistance check mode. 2. Place the (-) terminal of the multimeter on pins 7, 8, 11, 12 of connector CN5 on the TAMA board. 3. Place the (+) terminal on pin 2 of connector CN7 on the TAMA board. (GND) With power off, does the multimeter detect “00” ?	No	Replace the paper feed motor with TAMA board.
The paper path may be bad.	4	—	—	Reassemble the paper path.

Table 5-10. Paper is Not Fed (2)

Cause	Step	Checkpoint	Finding	Solution
The paper end sensor may be dead.	1	Does the sensor toggle? (Check with **multimeter)**	**No**	Replace the paper end sensor.
The release sensor may be dead.	2	Does the sensor toggle? (Check with **multimeter)**	No	Replace the release sensor.
The paper feed motor may be dead.	3	Disconnect **CN5** on the **TAMA** board and check the coil resistance between: pin 12 and pin 10; pin 8 and pin 10; pin 11 and pin 9; pin 7 and pin 9 (4 points total) on the disconnected cable side using a **multimeter.** Pin 12- Pin 10 Pin 8- Pin 10 Pin 11- Pin 9 Pin 7- Pin 9 Are the resistances of all four points approximately 40 ohms?	No	Replace the paper feed motor.
		If any coil is shorted, check the paper feed motor drive circuit using the following procedure: 1. Set the **multimeter** to resistance check mode. 2. Place the (-) terminal of the **multimeter** on pins 7, 8, 12 of connector **CN5** on the **TAMA** board. 3. Place the (+) terminal on pin 2 of connector **CN7** on the **TAMA** board. **(GND)** With power off, does the **multimeter** detect "co" ?	No	Replace the paper feed motor with **TAMA** board.
The paper path may be bad.	4	—		Reassemble the paper path.

Table 5-11. Paper Out Displayed

Cause	Step	Checkpoint	Finding	Solution
The paper end sensor is dead.	1	—	—	**Replace the paper end** sensor.

Table 5-12. Abnormal Voltage Displayed

Cause	Step	Checkpoint	Finding	Solution
The CR motor, PF motor or printhead coil is short.	1	Connector CN5 and CN8 disconnect, and power on. Does printer not display abnormal voltage?	Yes	Replace CR motor, PF motor or printhead.
The TAMA board may be bad.	2	—	—	Replace TAMA board.

Table 5-13. Incorrect SRAM Displayed

Cause	Step	Checkpoint	Finding	Solution
The TAMA board may be bad.	1	—	—	Replace the TAMA board.

Table 5-14. Incorrect RAM Inside CPU Displayed

Cause	Step	Checkpoint	Finding	Solution
The TAMA baord may be bad.	1	—	—	Replace the TAMA board.

Table 5-15. Self-test is Abnormal

Cause	Step	Checkpoint	Finding	Solution
Connectors on the printhead maybe disconnected.	1	Is connectors on the printhead disconnected?	Yes	Connect connector on the printhead.
Ink ribbon may be bad.	3	Is printing OK after ink ribbon replacement?	Yes	Replace the ink ribbon.
Printhead maybe bad.	5	—	—	Replace the printhead.

Table 5-16. Self-test Printout has Poor Quality (1)

Cause	Step	Checkpoint	Finding	Solution
The printhead wire may be broken.	1	Check the printhead. Are wires OK?	No	Replace the printhead.
The printhead coil short or open.	2	Check the printhead coil resistance by multimeter. .(refer to figure 5-1) Are coils short or open?	Yes	Replace the printhead.
		If any coil is shorted, check the printhead drive circuit using the following procedure: 1. Set the multimeter to resistance check mode. 2. Place the (-) terminal of the multimeter on collector of printhead drive transistor on the TAMA board. 3. Place the (+) terminal on emitter of transistor on the TAMA board. (GND) With power off, does the multimeter detect "00" ?	No	Replace the paper feed motor with TAMA board.

Table 5-17. Self-test Printout has Poor Quality (2)

Cause	Step	Checkpoint	Finding	Solution
Paper feed mechanism may be bad.	,	Check the paper feed mechanism gears and rollers. Are there OK?	No	Replace or reassemble gears and rollers.
The paper feed motor may be dead.	2	Disconnect CN5 on the TAMA board and check the coil resistance between: pin 12 and pin 10; pin 8 and pin 10; pin 11 and pin 9; pin 7 and pin 9 (4 points total) on the disconnected cable side using a multimeter. Pin 12- Pin 10 Pin 8- Pin 10 Pin 11- Pin 9 Pin 7- Pin 9 Are the resistances of all four points approximately 40 ohms?	No	Replace the paper feed motor.
		If any coil is shorted, check the paper feed motor drive circuit using the following procedure: 1. Set the multimeter to resistance check mode. 2. Place the (-) terminal of the multimeter on pins 7, 8, 11, 12 of connector CN5 on the TAMA board. 3. Place the (+) terminal on pin 2 of connector CN7 on the TAMA board. (GND) With power off, does the multimeter detect "∞" ?	No	Replace the paper feed motor with TAMA board.
The paper path may be bad.	3	—	—	Reassemble the paper path.

Table 5-18. Abnormal Printing in On-line Mode (1)

Cause	Step	Checkpoint	Finding	Solution
The bi-directional printing value may be bad.	1	—	—	Adjust the bi-directional printing position. (Refer to chapter 4)

Table 5-19. Abnormal Printing in On-line Mode (2)

Cause	Step	Checkpoint	Finding	Solution
Software setting may be bad.	,	Is it OK?	No	Set the software settings.
Dip switch settings of printer may be bad.	2	Is it OK?	No	Set the dip switch settings.
Interface cable may be bad.	3	Change the interface cable. Does it print OK?	No	Replace the interface cable.
The TAMA board may be bad.	4	—	—	Replace the TAMA board.

Table 5-20. Abnormal Printing in On-1ine Mode (3)

Cause	Step	Checkpoint	Finding	Solution
Software setting may be bad.	,	Is it OK?	No	Set the software settings.
Dip switch settings of printer may be bad.	2	Is it OK?	No	Set the dip switch settings.
Interface cable may be bad.	3	Change the interface cable. Does it print OK?	No	Replace the interface cable.
The TAMA board may be bad.	4	—	—	Replace the TAMA board.

5.3.2 Unit Repair - TAMA Main Control Board

This section describes the problems related to the main control board (TAMA). The table below provides various symptoms, likely causes, and checkpoints. The checkpoints refer to waveforms, resistance, and other values to be checked to evaluate the operation of each component.

Table 5-21. Repair of the TAMA Board

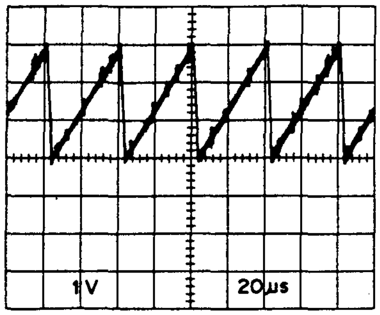
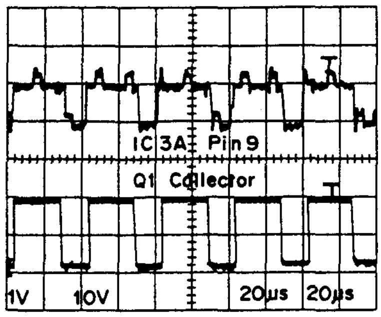
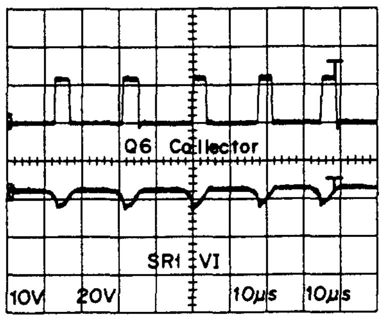
Symptom	Condition	Cause	Checkpoint	Solution
The printer does not operate at all.	The +24V is dead.	IC 3A is defective	At IC 3A, check the input waveform at pin 5. 	Replace IC 3A.
		IC 3Aor transistor Q1 (Q2) is defective.		Replace 2C 3A or Q1(Q2).
	The +5V is dead.	SRI or transistor Q6 is defective.		Replace SRI or Q6.

Table 5-21. Repair of the TAMA Board (Continued)

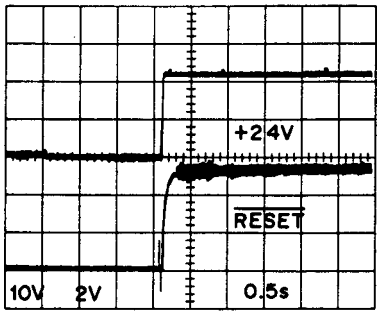
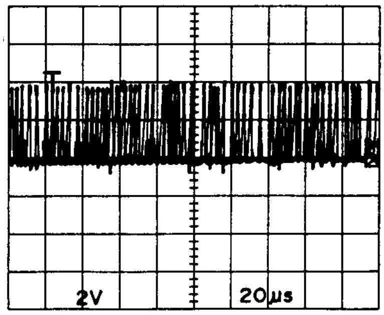
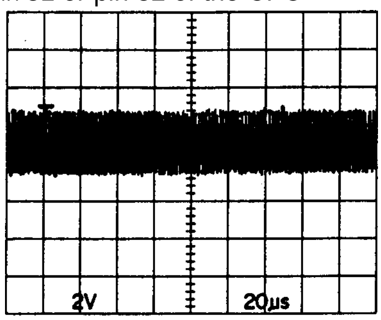
Symptom	Condition	cause	Checkpoint	Solution
The printer does not operate at all.	The CPU is not operating.	The reset circuit is not operating.	Check the voltage waveforms at the +24V and for the RESET signal. 	Replace Q5.
		Selection of control ROM is abnormal.	Check pin 54 of IC 2C for a changing signal HIGH/LOW. 	Replace IC 3C.
		RAM is defective	—	Replace IC 3D.
		The CPU is defective	Check for oscillator signal at either pin 31 or pin 32 of the CPU 	Replace

Table 5-21. Repair of the TAMA Board (Continued)

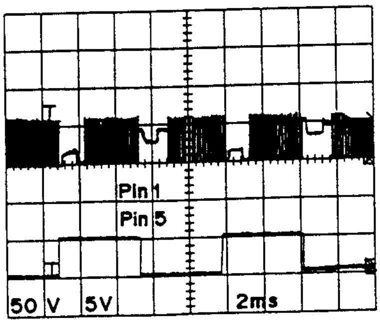
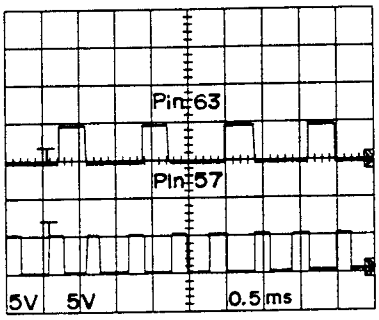
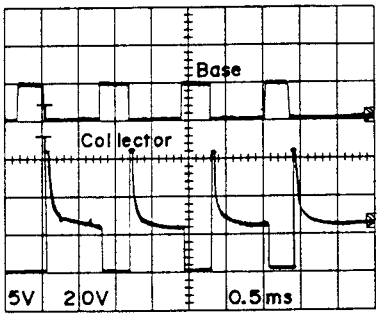
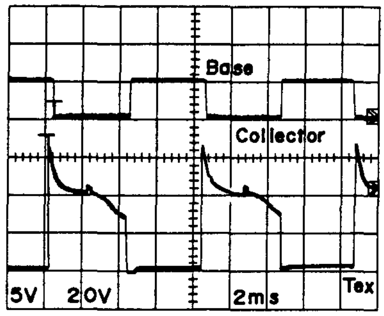
Symptom	Condition	Cause	Checkpoint	Solution
he carriage perates bnormally.	The carriage does not operate at all.	IC 3B or IC 1A is defective	At IC 1A, check the input signal at pin 5 and the output waveform at pin 1. 	Replace 3B or 1A
	Carriage operation is unstable (lack of torque)	The reference voltage generating circuit is faulty.	Check transistor Q17, Q18 and Q19	Replace Q17, Q18 or Q19
Self-test printing abnormal	Self-test printing is not executed	IC 3B is defective	At IC 3B, check the input signal at pin 57 and the output signal pin 1, 2, 3, 58, 59, 60, 61, 62, and 63. 	Replace 3B
		Transistor Q7 - Q15 are defective	At Q7 - Q15, check the base waveform and the collector waveform. 	Replace Q7 - Q15

Table 5-21. Repair of the TAMA Board (Continued)

Symptom	Condition	Cause	Checkpoint	Solution
Paper is not ed normally	The paper feed pitch is abnormal (open phase)	The IC 3B or transistor Q21, Q22, Q23, and Q24 defective.	At Q21 - Q24, check the base waveform and collector waveform. 	Replace Q21 - Q24 or IC 3B.
	The paper does not feed, or the feed pitch is abnormal (lack of torque)	Q16 or Q20 is defective	Check transistor Q16 or Q20.	Replace Q 16 or Q20
Printing in ON-LINE node is ibnormal	Data corruption occurs when the parallel interface is used	IC 3B is defective.	Check the input/output signals of IC 3B.	Replace IC 3B

Chapter 6 Maintenance

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6.1 MAINTENANCE

Proper maintenance assures optimal and long-term printer performance and minimizes the occurrence of malfunctions.

WARNING

> *Be sure to disconnect the **printer from** the power supply before maintenance.*
> *Do not apply thinner, **trichloroethylene,** or ketone-based solvents to any of the printer's plastic components.*

6.1.1 Preventive Maintenance

The case exterior should be regularly cleaned with alcohol. Occasionally vacuum clean the interior of the mechanism to remove accumulated dirt, dust, and paper particles.

After the unit has been cleaned, check that it is adequately lubricated (refer to Section 6.2, below). Before returning the printer to the customer, inspect the springs, paper-feed rollers, and the basic operation of the unit.

6.1.2 Lubrication and Adhesive Application

EPSON recommends lubrication at the points illustrated in Figure 6-2. Table 6-2 provides a list of these points, and the recommended lubricant to be used for each. The lubricants--EPSON O-2, EPSON G-26, and EPSON G-37--have all been thoroughly tested and fully meet the needs of this printer. (Table 6-1 lists details of these lubricants.)

Before applying any lubricant, make sure that the part to be lubricated is clean. Do not apply excess lubrication, as this can potentially cause damage.

Following its disassembly or replacement, adhesive must be applied to the part indicated in Table 6-3. EPSON recommends application of Neji lock #2 (G) adhesive to the point illustrated in Figure 6-1. When applying the adhesive, be careful that no excess overflows onto nearby parts.

Table 6-1. Lubrication and Adhesive

Type	Name	Capacity	Availability	Parts No.
Oil	O-2	40 cc	E	B710200001
Grease	G26	40 gm	E	B702600001
Grease	G37	40 gm	E	B703700001
Adhesive	Neji lock #2 (G)	40 gm	E	B730200200

E: EPSON-exclusive product

Table 6-2. Lubrication Points

Ref. No.	Lubrication Points	Lubricant
(1)	Contact portion of paper feed lever drive shaft and paper feed lever	G-26
(2)	Contact portion of paper feed lever drive shaft and base frame	G-26
(3)	Oil pad	o-2
(4)	Contact portion of release lever and paper feed lever drive shaft	G-26
(5)	Contact portion of adjust lever and side frame left	G-26
(6)	Contact portion of adjust lever and side frame left	G-26
(7)	Contact portion of belt pulley and ribbon gear	G-26
(8)	Contact portion of carriage and carriage guide plate	G-26
(9)	Contact portion of tractor disengage cam and gear	G-26
(lo)	Gear portion of the ribbon gear	G-26
(11)	Shaft which sets the ribbon gears	G-26
(12)	Paper feed roller shaft	G37

Note: ***Lubrication is necessary** when assembling.*

Table 6-3. Adhesive Application Points

Ref. No.	Adhesive Application Points	No. of Points
(21)	**Where the timing belt engages the carriage**	1
(22)	**Contact portion** of side frame and paper guide	2

<To Timing Belt>

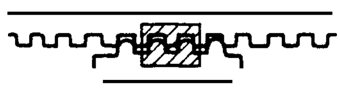


Figure 6-1. Correct Adhesive Application

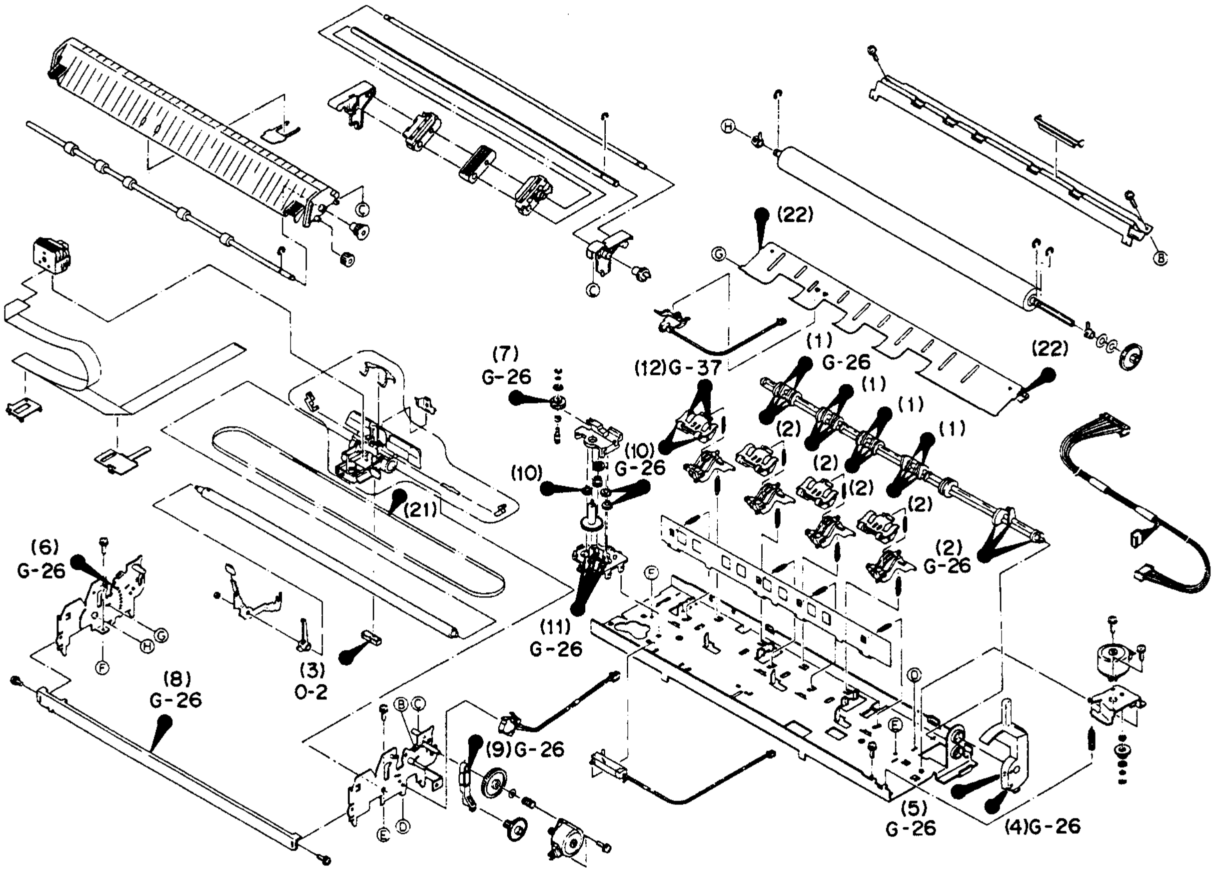


Figure 6-2. Lubrication Points

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A.1 CONNECTOR SUMMARY

Figure below shows the interconnection between the major components of the LX-1050+.

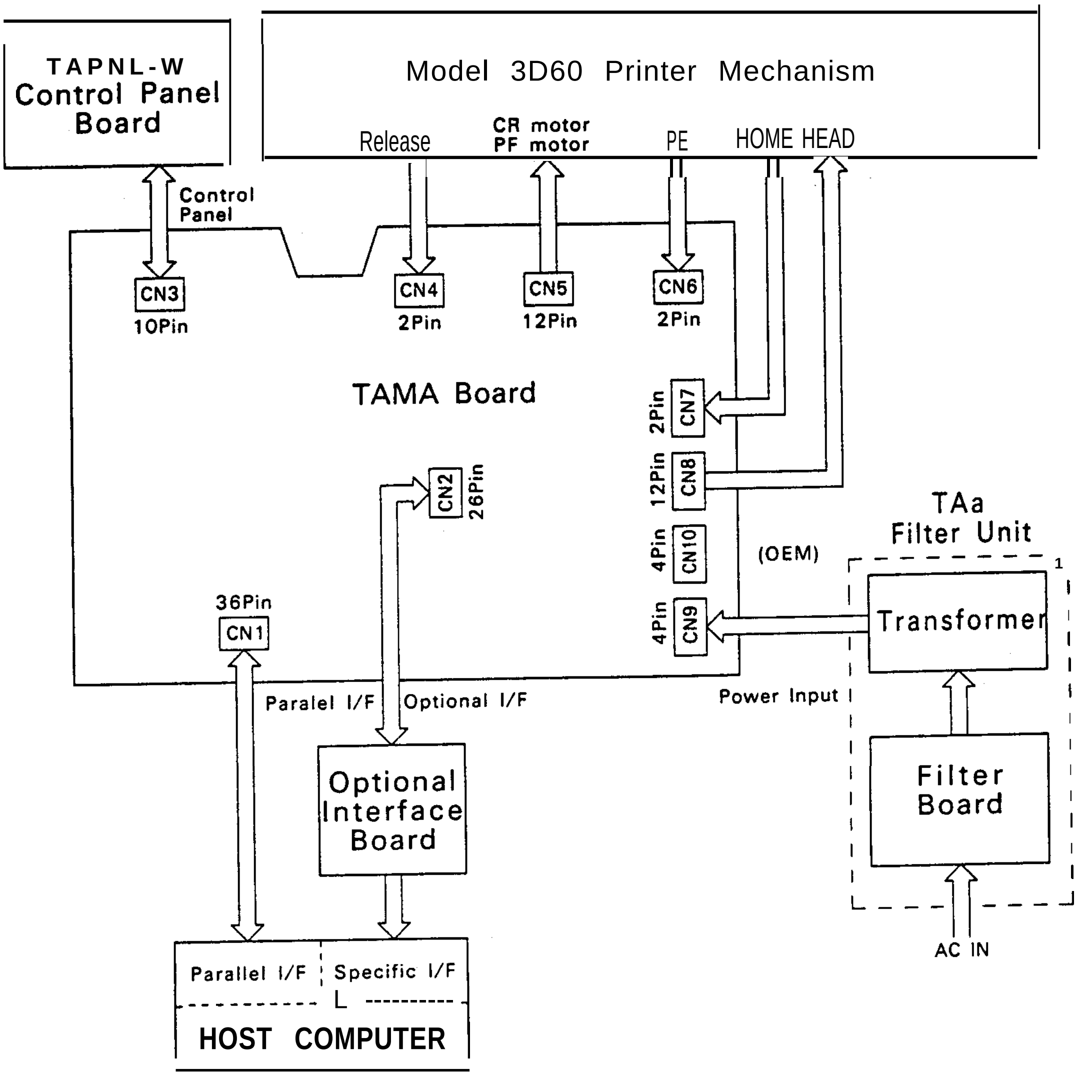


Figure A-1. Interconnection of Major Components

Table A-1. Connector Summary

Connector	Description	Pins	Reference
TAMA Main Control Board			
CN1	Parallel interface	36 pin	Table 1-5
CN2	Optional interface board connector	26 pin	Table A-2
CN3	Control panel	10 pin	Table A-3
CN4	Release lever	2 pin	Table A-4
CN5	CR motor and PF motor	12 pin	Table A-5
CN6	PE sensor	2 pin	Table A-6
CN7	Home Position sensor	2Pin	Table A-7
CN8	Printhead	12 pin	Table A-8
CN9	AC voltage input	4 pin	Table A-9
CN1O	Not used	4 pin	—
TA-a Filter Unit			
CN1	AC voltage output	2 pin	Table A-9
TAPNL-W Control Panel			
CN1	TAMAboard	IOpin	Table A-3

Table A-2. Connector Pin Assignment - CN2

Pin No.	Signal Name	I/O	Description
1	ERR	O	Error Signal
2	PE	0	PE Signal
3	D7	I	Data Bit 7
4	BUSY	O	BUSY Signal
5	D6	I	Data Bit 6
6	ACK	O	ACKNLG Signal
7	D5	I	Data Bit 5
8	IN ITRD4	I	Initialize
9	STB	I	Data Bit 4
10	D8	I	Strobe Signal
11	AC12	I	Data Bit 8
12	RESET	·	GND
13	AC12	0	Reset Signal
14	D3	—	12 VAC
15	+5V	I	Data Bit 3
16	D2	—	+5 VDC
17	+24V	I	Data Bit 2
18	D1	—	+24 VDC
19	+12V	I	Data Bit 1
20	P/S	—	+12 VDC
21	—	I	Parallel/Serial
22		—	—
23	SLCTIN	I	SLCTIN Signal
24	GND	—	GND
25	TxD	o	TxD
26	GND	—	GND

Table A-3. Connector Pin Assignment - CN3

Pin No.	Signal Name	I/O	Description
1	GND	—	GND
2	LF SW	I	LF SW
3	FF SW	I	FF SW
4	ON LINE SW	I	ON LINE SW
5	LIE SW	I	LOAD/EJECT SW
6	PE LP	O	PE LED drive
7	ONLINE LP	0	ON LINE LED drive
8	READY LP	0	READY LED drive
9	+5V	—	+5 VDC
10	BUZZER	O	Buzzer drive

Table A-4. Connector Pin Assignment - CN4

Pin No.	Signal Name	I/O	Description
1	RELEASE	I	RELEASE sensor
2	GND	—	GND

Table A-5. Connector Pin Assignment - CN5

Pin No.	Signal Name	I/O	Description
1	CRD	O	CR Phase D
2	CRB	O	CR Phase B
3	CRCDCOM	O	CR CD Common
4	CRABCOM	O	CRAB Common
5	CRC	O	CR Phase C
6	CRA	O	CR Phase A
7	PFD	O	PF Phase D
8	PFB	O	PF Phase B
9	PFCOM	O	PF Common
10	PFCOM	O	PF Common
11	PFC	O	PF Phase C
12	PFA	O	PF Phase A

Table A-6. Connector Pin Assignment - CN6

Pin No.	Signal Name	I/o	Description
1	PE	I	Paper end
2	GND	—	GND

Table A-7. Connector Pin Assignment - CN7

Pin No.	Signal Name	I/O	Description
1	HOME	I	Home position
2	GND	—	GND

Table A-8. Connector Pin Assignment - CN8

Pin No.	Signal Name	I/O	Description
1	H6	O	Head drive signal 6
2	H8	O	Head drive signal 8
3	H4	O	Head drive signal 4
4	H9	O	Head drive signal 9
5	H2	O	Head drive signal 2
6	COM	—	Common
7	COM	·	Common
8	COM	—	Common
9	H3	O	Head drive signal 3
10	H5	O	Head drive signal 5
11	HI	O	Head drive signal 1
12	H7	O	Head drive signal 7

Table A-9. Connector Pin Assignment - CN9

Pin No.	Signal Name	I/O	Description
1	AC1	—	26 VAC
2	AC1	—	26 VAC
3	AC2	—	12 VAC
4	AC2	—	12 VAC

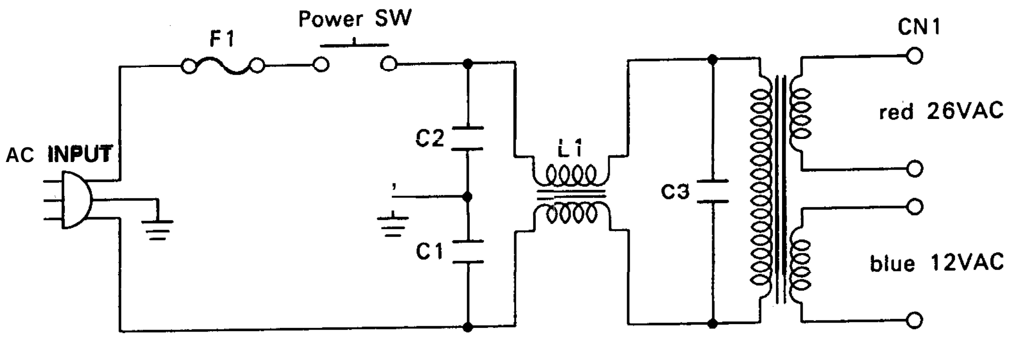


Figure A-3. TA-a Filter Unit Circuit Diagram

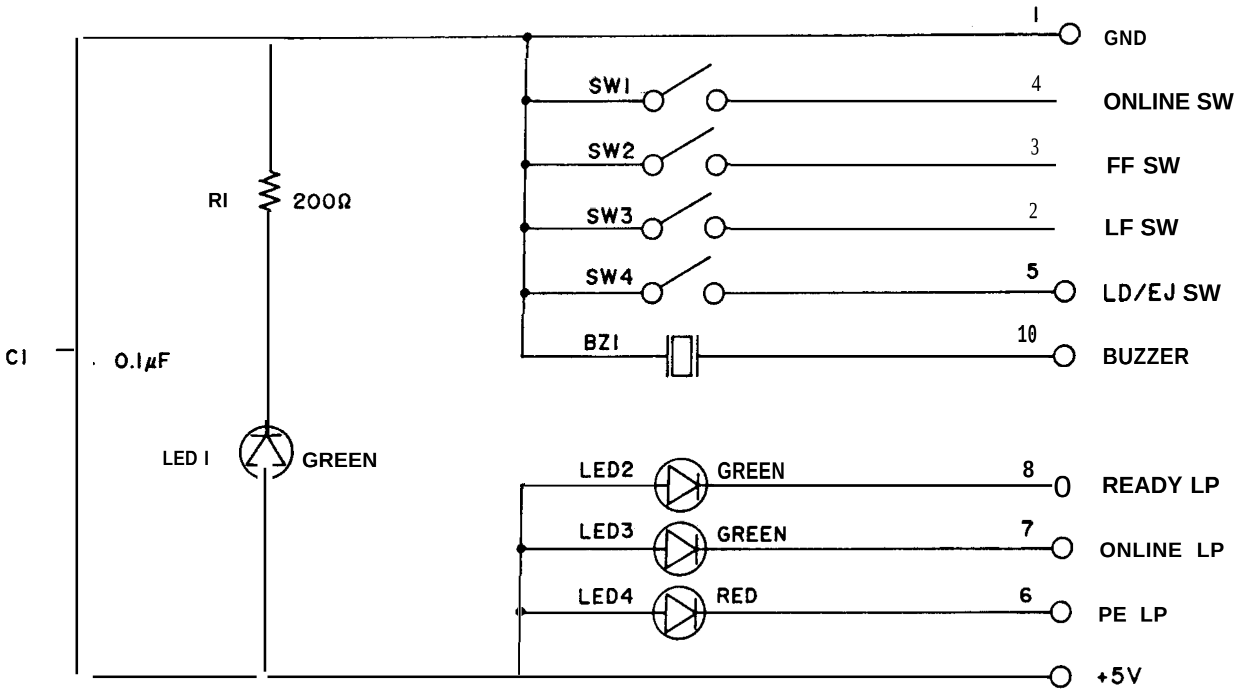


Figure A-4. Control Panel Circuit Diagram

A.3 CIRCUIT BOARD COMPONENT LAYOUT

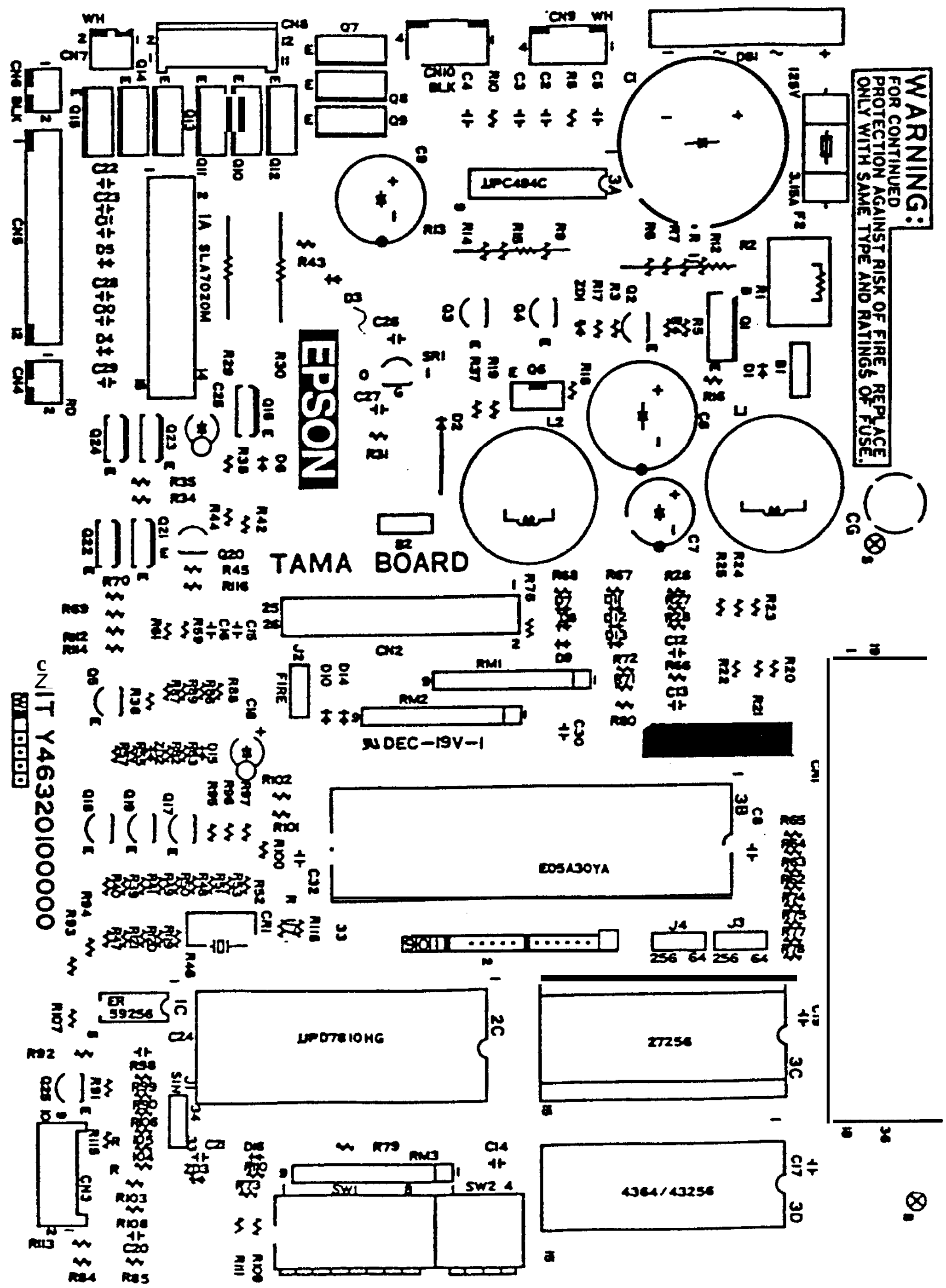


Figure A-5. TAMA Main Control Board Component Layout

A.4 EXPLODED DIAGRAM

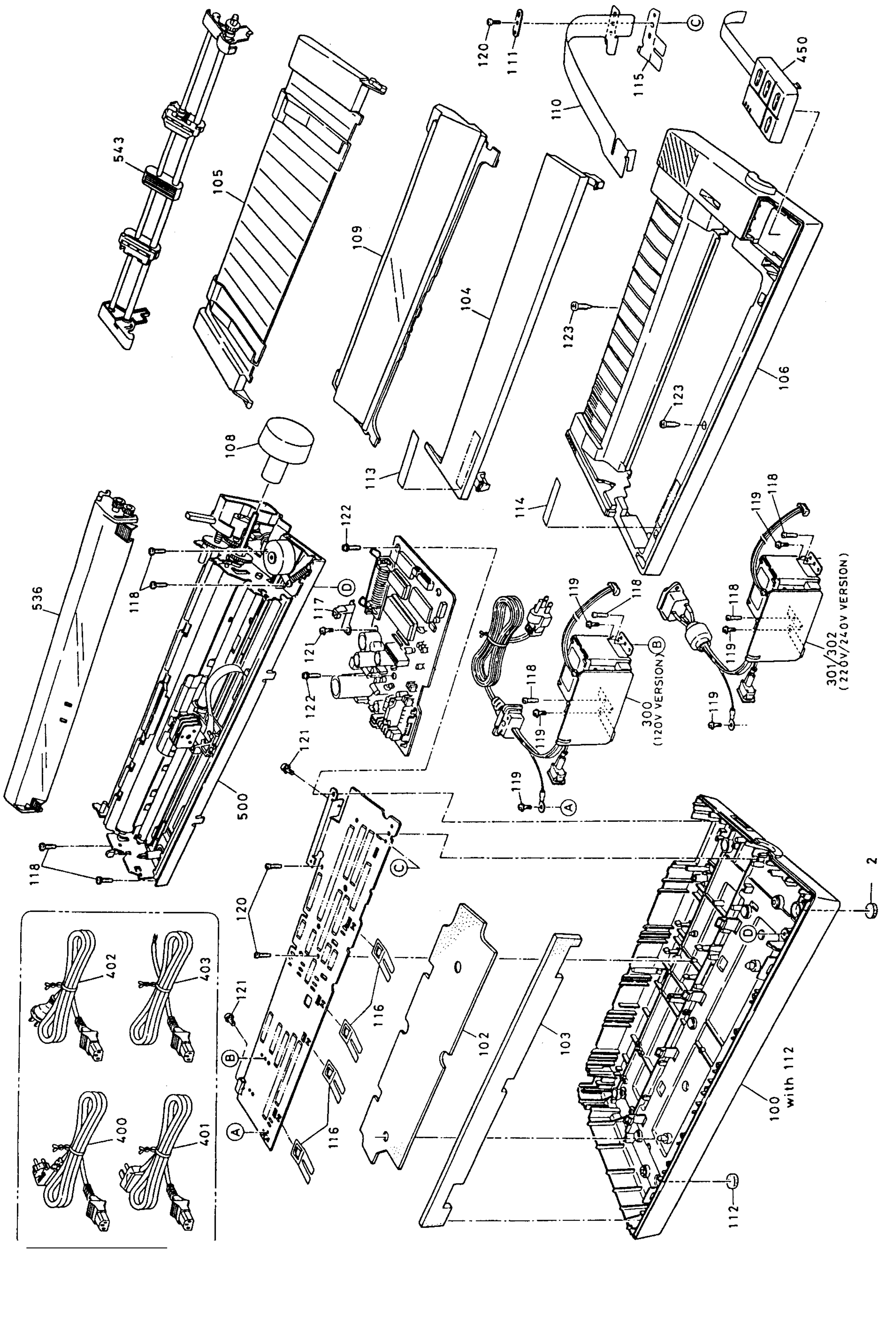


Figure A-6. LX-1050+ Exploded Diagram

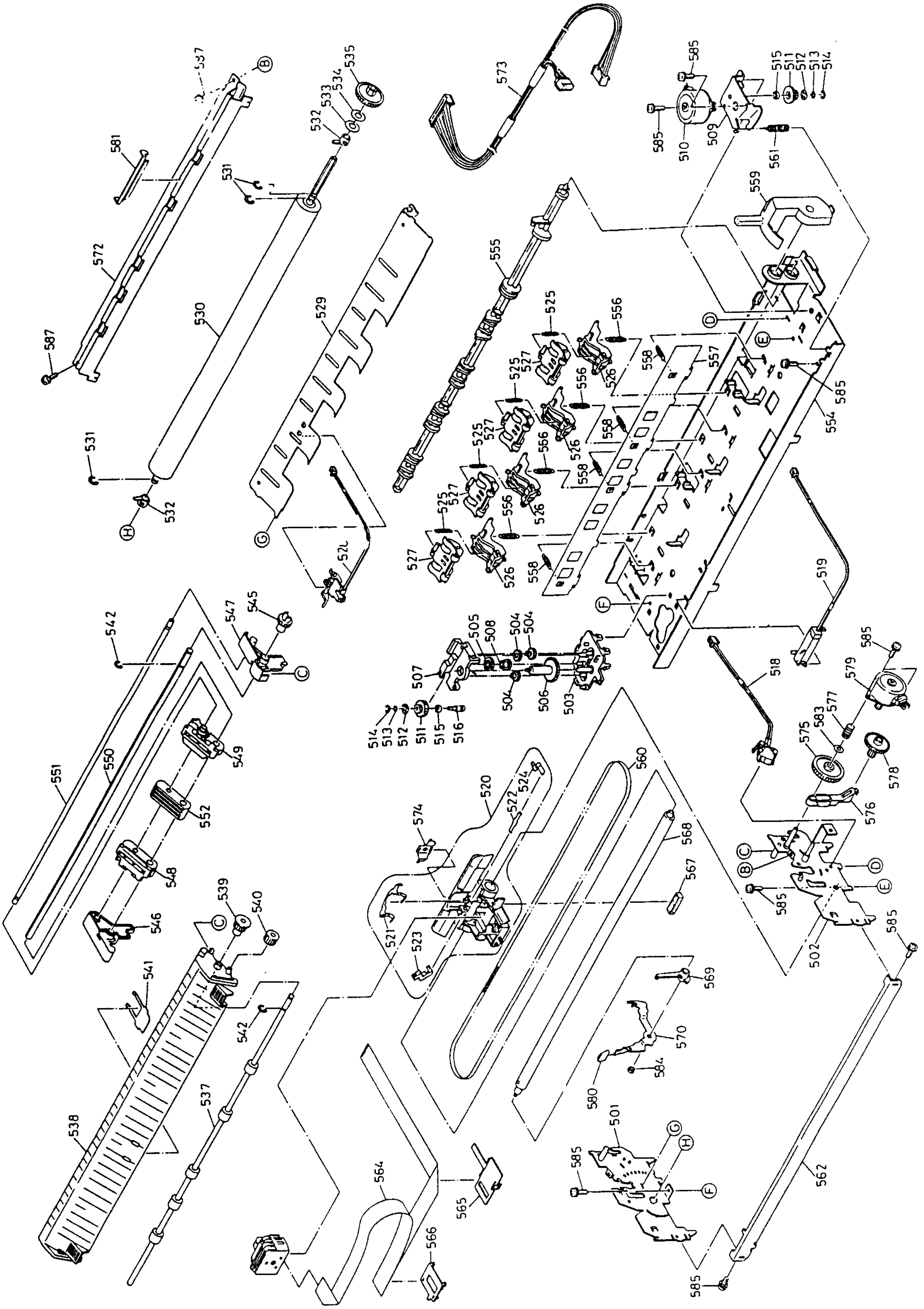


Figure A-7. Printer Mechanism Exploded Diagram

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